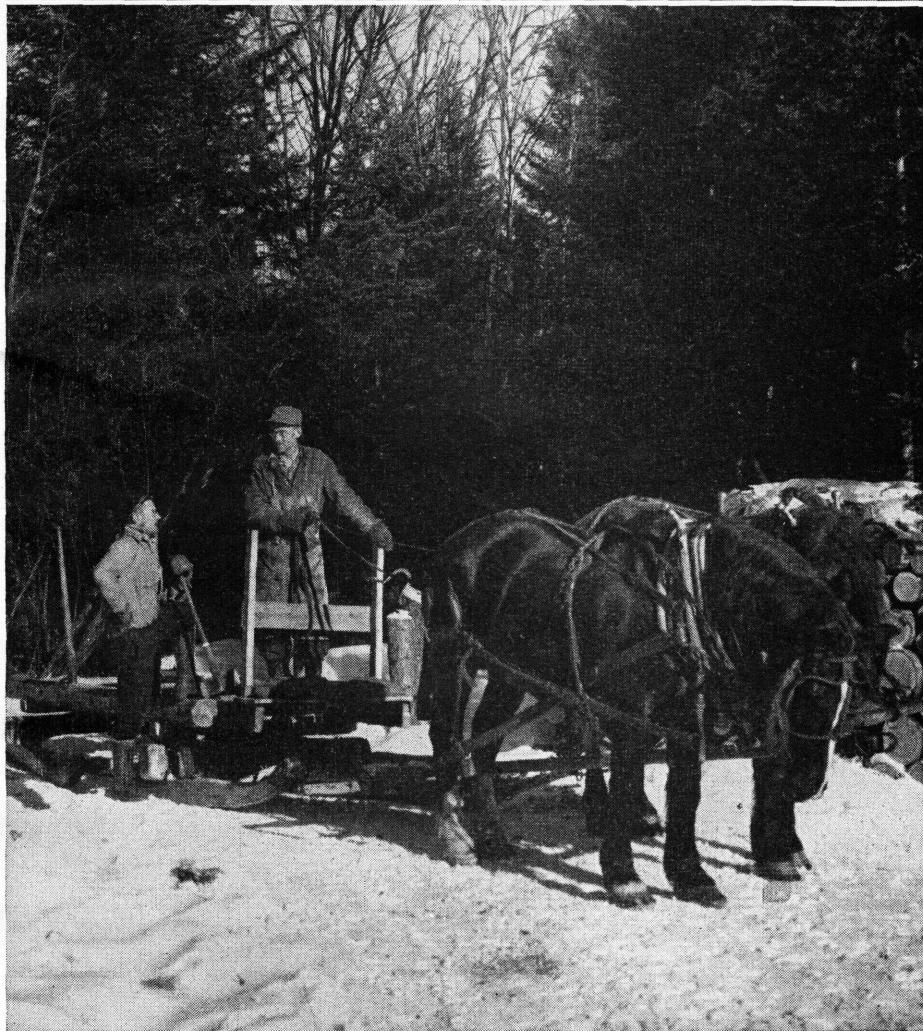


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LOGGING FARM FOREST CROPS IN THE NORTHEAST



FARMERS' BULLETIN NO. 2008 • U. S. DEPARTMENT OF AGRICULTURE

PREFACE

Many farmers ask : "What's the best way for me to log my wood lot?" They want to know about the equipment and methods that will make the job easier and more profitable. The questions show a growing need for some easy-to-use information on the subject. To fill this need, a committee was organized to study the problem. This committee outlined the kind of information that is needed, and asked Fred C. Simmons, logging specialist of the United States Forest Service's Northeastern Forest Experiment Station, Upper Darby, Pa., to write the bulletin.

Members of the committee helped in providing illustrations, reviewed the manuscript, and made many helpful suggestions. The members of the committee are :

- K. E. BARRACLOUGH, Extension Forester, New Hampshire.
- F. M. CALLWARD, Extension Forester, Connecticut.
- J. A. COPE, Extension Forester, New York.
- R. T. FOULDS, Extension Forester, Vermont.
- R. N. JORGENSEN, Extension Forester, Rhode Island.
- A. C. MCINTYRE, Soil Conservation Service, United States Department of Agriculture.
- G. O. OLESON, Extension Information Specialist, Massachusetts.
- R. B. PARMENTER, Extension Forester, Massachusetts.
- W. K. WILLIAMS, Extension Service, United States Department of Agriculture.
- A. D. NUTTING, Forest Commissioner, State of Maine.
- F. E. HOLT, Extension Forester, Maine.
- C. J. JOHNSON, Extension Forester, West Virginia.
- H. W. DENGLER, Extension Forester, Maryland.

The author gratefully acknowledges the help and advice given by this committee and by others in the Northeast, as well as by many others outside this region.

Washington, D. C.

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Contents

Page		Page	
Introduction-----	1	Lay-out of the logging job—Con.	30
Choice and use of logging equipment-----	2	Landings-----	32
Hand tools-----	2	Skidways-----	33
The ax-----	2	Felling-----	33
Hand saws-----	2	Llimbing-----	37
Power saws-----	6	Bucking-----	38
Wedges-----	11	Choice of location-----	38
Peavies, cant hooks, and	17	Bucking small trees by hand-----	39
pulp hooks-----	21	Bucking big trees by hand-----	39
Peeling tools-----	23	Bucking with power saws-----	40
Farm equipment useful in	23	Skidding-----	42
logging-----	25	With horses-----	42
Horses-----	25	With tractors-----	48
Wheeled tractors-----	25	Loading-----	50
Light crawler tractors-----	25	Loading small wood by	
Farm trucks-----	26	hand-----	50
Specialized logging equipment-----	26	Loading small wood by	
Lay-out of the logging job-----	27	machine-----	50
Permanent improvements-----	27	Loading logs and poles by	
Logging roads-----	28	hand-----	51
Skid trails-----	28	Simple mechanical means of	
		log loading-----	52
		Hauling-----	54

LOGGING FARM FOREST CROPS IN THE NORTHEAST

By FRED C. SIMMONS, *logging specialist, Northeastern Forest Experiment Station, Forest Service*

INTRODUCTION

FARM WOODLANDS make up about 40 percent of the timbered area of the Northeastern States. They may comprise up to 60 percent or more of the area of the individual farm. Yet, on most farms, wood lots do not contribute their fair share of the farmer's annual income.

There are two main reasons for this, both of them going back to the fact that the northeastern farmer generally lets someone else do the logging on his wood lot. This means, first, that he loses about two-thirds of the income he could have obtained from his trees. For practically no other crop does the farmer follow this system. He does not sell his corn standing in the field, nor his potatoes in the ground.

Second, it means that the farmer usually has little control over the type of cutting that is done. At long intervals, when he needs money for some purpose, he will sell for a lump sum the standing timber he happens to have, and the operator will cut it as he pleases. Little attention is paid to forest cultural practices. This so reduces the quality and quantity of the growing stock that the northeastern wood lots generally are producing only a small fraction of the volume and value that they are capable of producing.

This bulletin will tell you how you can harvest the timber crops from your wood lot with the equipment you already have or can acquire.

When you do your own logging you will find that there are many advantages besides a bigger cash income from your wood lot. Logging is a good way—and a profitable way—to use your time and to keep your hired help busy when other work on the farm is slack (fig. 1). Wood products you need on the farm, particularly material like fuel wood, fence posts, and poles, can be obtained as byproducts of logging jobs.

These products for home use can frequently be obtained from stand-improvement cuttings that can be made every year; these will result not only in useful material but will also improve the growth of the trees that remain. Both the commercial and the improvement operations, if they are conducted properly, reduce hazards from fire, insects, disease, and windthrow.

This bulletin will deal only incidentally with methods of forest management. There are many good publications on that subject.¹

¹ Among recent publications on the subject are the following: Koroleff, A., and Fitzwater, J. A. *Managing small woodlands.* 72 pp., illus. Amer. Forestry Assoc. Washington, D. C. 1947. U. S. Department of Agriculture. *Managing the small forest.* U. S. Dept. Agr. Farmers' Bul. 1989. 61 pp., illus. Washington, D. C. 1947.

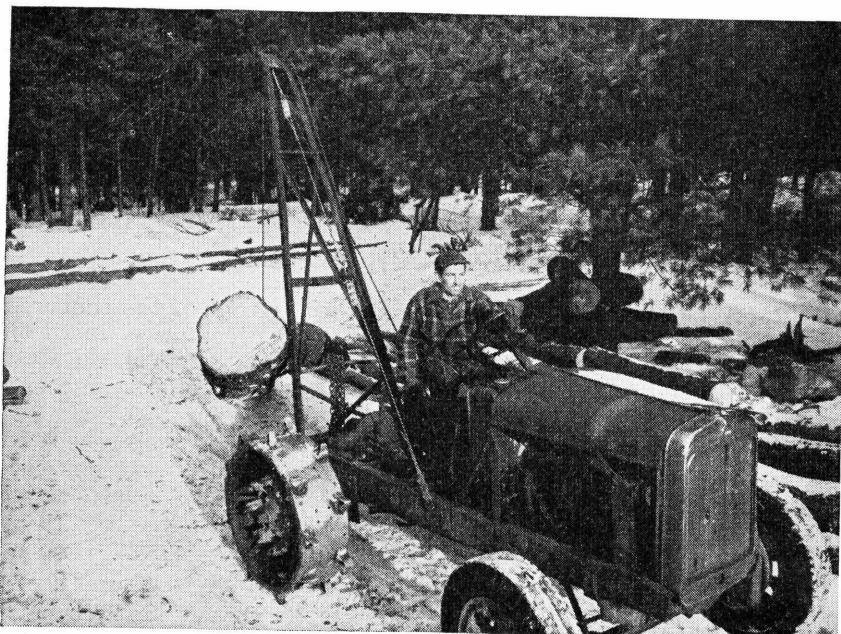


FIGURE 1.—A farmer finds it profitable to log his own wood lot.

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Advice and help in management and marketing is also available from the Extension Service, and from your State forestry department.

CHOICE AND USE OF LOGGING EQUIPMENT HAND TOOLS

The Ax

In spite of all the mechanized equipment that the modern logger uses, the ax is still his most important tool. It is used in clearing slash and brush for space in which to work safely, it is used for making the top part of the felling undercut, and it is the best tool for removing most limbs. Small saplings and poles can be cut more quickly and easily with the ax than with any other tool.

There are many different patterns and weights of axes. Choosing among them is largely a matter of individual preference. Entirely different types of axes are used by different cutters for exactly the same kind of cutting, with equal success. Generally the lighter axes with shorter handles are most useful for cutting small growth and for limbing and cutting brush in restricted quarters. Double-bit axes are usually the choice of the professional woodsman in the North. One bit can be kept keen and thin for fast chopping, and the other somewhat thicker—but sharp—for hard cutting such as hemlock knots or for work around rocks or dirt. However, the single-bit ax is a safer tool. It can be used for driving stakes and wooden wedges, and the blade can be stuck in a log or stump without leaving the other edge exposed to injure someone who might stumble on it.

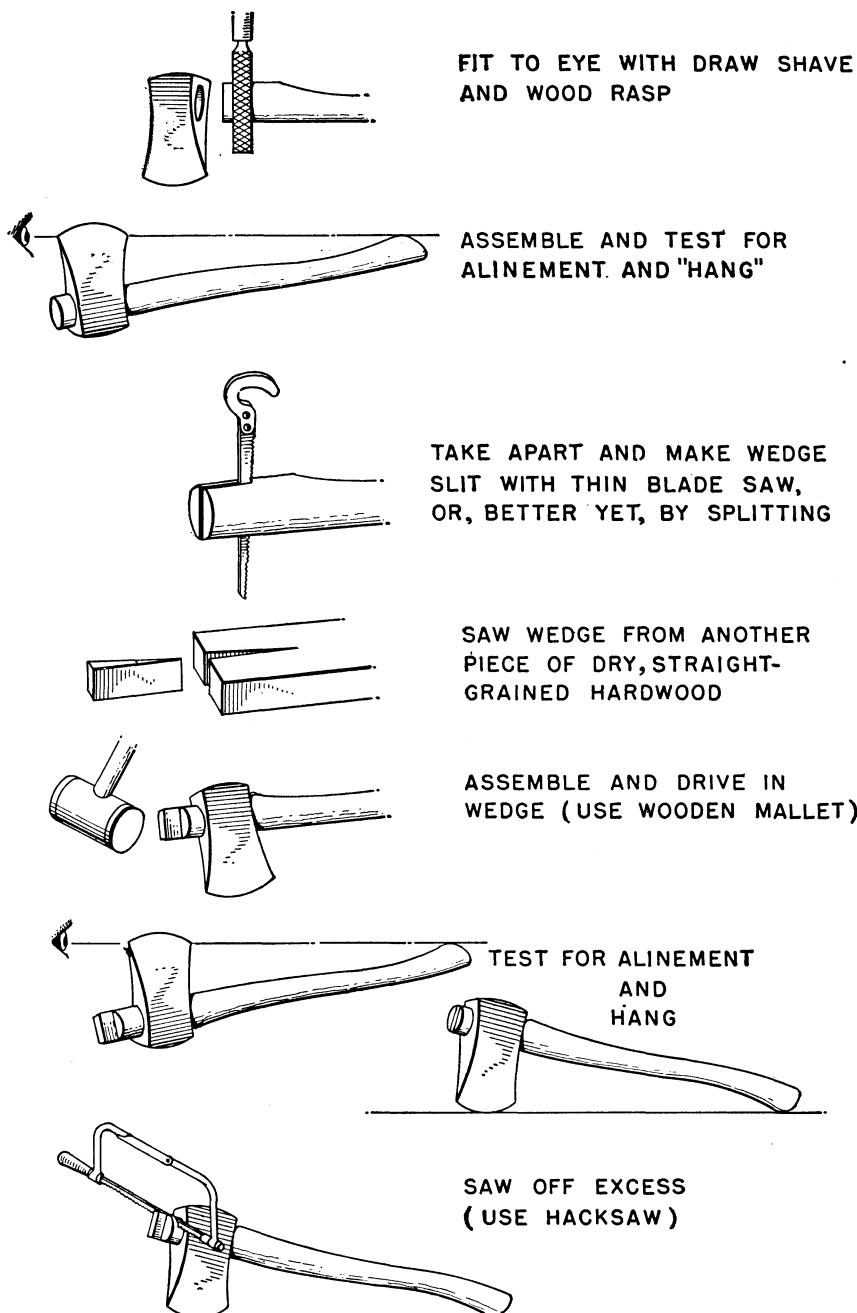


FIGURE 2.—Steps in hanging an ax.

The essential things are, however, that the ax have a well-balanced head of high-quality, well-tempered steel, and a well-fitted strong and smooth handle. The top-grade axes of all the better manufacturers meet these requirements.

In choosing an ax it makes little difference whether the head is of one piece of steel, with the cutting edge specially tempered, or of two, with a special tool-steel edge welded onto a softer body. Good ax manufacturers can make a good tool either way. Also it makes little difference whether the handle is red or white hickory. Tests have shown that both kinds are equally strong. The handle should be smooth and straight-grained, and free from pin knots or bird pecks.

In hanging an axhead (fig. 2) be sure that the handle and the wooden wedge used are dry. Then they can swell a little as they pick up moisture in use, and will remain tight.

Most axes, as they come from the manufacturer, have too thick a blade for efficient chopping. Consequently it is necessary to thin them down for an inch or so back from the edge. You can do this (fig. 3) with a sharp mill file or—better yet—on a wet, slowly moving grindstone. Never use a coarse file or an emery wheel; these leave the surfaces too rough, and the latter is apt to draw the temper. After sharpening, and at intervals during use, the ax should be kept sharp with a whetstone.

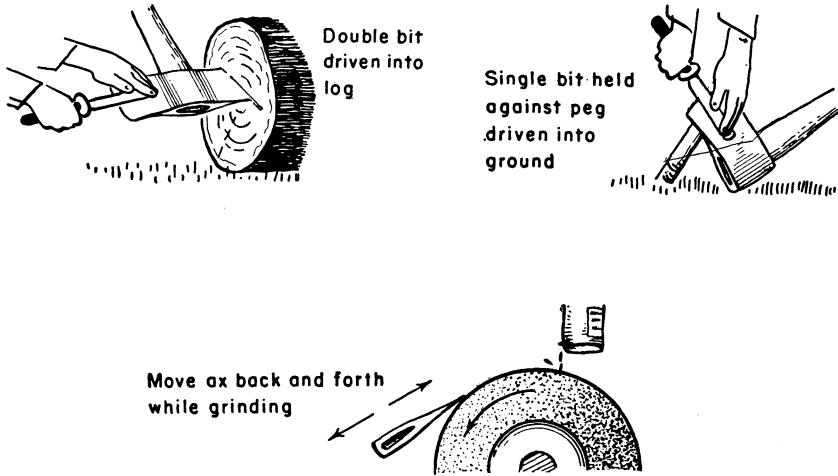


FIGURE 3.—Methods of filing and grinding an ax. Note the plywood guard on the file.

Ax gages have been devised to test the taper for various kinds of chopping. Two good ones, actual size so that replicas can be made from light sheet steel or brass, are illustrated in figure 4.

Chopping is an art easily learned by most Americans, who play so many games calling for a free and easy swing with a club. The important things are an easy and relaxed stance (fig. 5), and accuracy in each blow. It is not necessary to hit hard. Accuracy is more important than power.

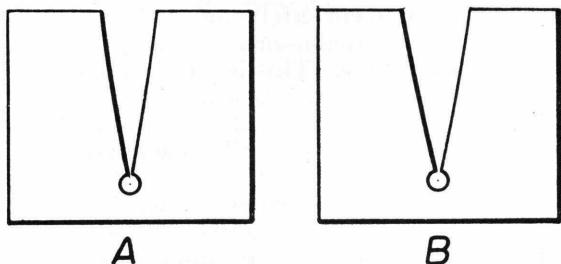
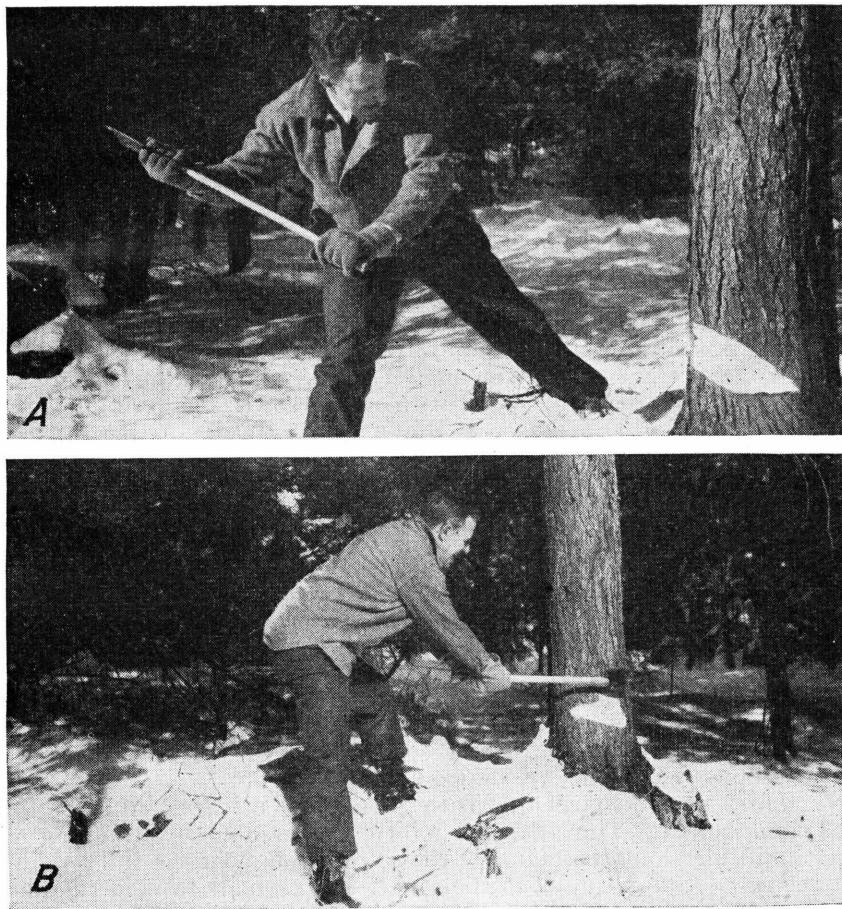


FIGURE 4.—Gages for testing the taper of the ax edge. *A*, for 2½-pound ax used on soft wood; *B*, for 3½-pound ax used on hard or knotty wood.



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FIGURE 5.—Stance for chopping: *A*, top of stroke; *B*, point of impact.

It is important to learn to chop both right handed and left handed. This will make it possible to cut safely and efficiently in close quarters in woods where it would be troublesome and dangerous for a man who could chop only from one side. This is particularly true in limbing.

In cutting small brush and saplings it helps to hold the piece being cut with one hand while chopping with the other. A larger sapling is more easily cut by bending it over with one hand, and then cutting the strained fibers.

The ax is a dangerous tool regardless of where it is used. Many accidents involve axes. Safe work habits can reduce these accidents materially. The safest way to carry an unsheathed ax is at your side, gripping it at the point of balance. Then, if you stumble or trip, you can easily throw the ax away from yourself. When not in use the ax should be stood or laid in a safe place, where workers are not likely to stumble over it. A simple leather sheath or plywood box should be used to cover the ax when it is carried in a vehicle or is carried by hand for long distances.

Hand Saws

The crosscut saw and the Swedish bow saw are the two most commonly used hand saws in the Northeastern States. The bow saw is ordinarily the most efficient tool for cutting timber less than 10 inches in diameter. It can be used by one man. The narrow blade gives little trouble with pinching, and a dull blade can be easily and quickly replaced. Generally a man can do half again as much work in this size timber with a bow saw as he can pulling one end of a crosscut.

The crosscut saw is the better tool for cutting larger trees by hand. It comes in straight-backed and sway-backed models. The straight-backed ones are stronger and are used in felling and bucking the larger trees. The sway-backed model, with its narrower blade, is used in smaller timber (10-15 inches in diameter) because a wedge can be inserted behind it in a fairly shallow cut.

Both crosscut and bow saws come in a variety of tooth patterns (fig. 6). The most common one for use with softwoods has four cutting teeth to each raker. The cutting teeth, one set to one side and the next to the other, cut the sides of the kerf. The rakers come along behind and (each acting like a tiny plane) remove shavings from the bottom of the cut. For hardwoods a pattern having two cutting teeth to one raker is usually preferred, because with the greater number of rakers each one does not have to plane so deeply. The patterns having all teeth of the cutting type are useful chiefly for dry wood.

Sharpening crosscut and bow saws involves the same principles, but different tools. Clamps are needed to hold the saw in place with the teeth up. Good ones are shown in figure 7.

The first step in sharpening is to get all the cutting teeth down to the same height. This is called jointing; it is done by dragging a worn mill file along the points of the teeth throughout the full length of the saw. Special jointing tools (fig. 8) are made to hold the file and keep it level.

The rakers have to be filed down lower than the cutting teeth. A raker-jointing gage is useful in doing this (fig. 9). It has a hardened steel plate with a slot in the center. This tool, after it is

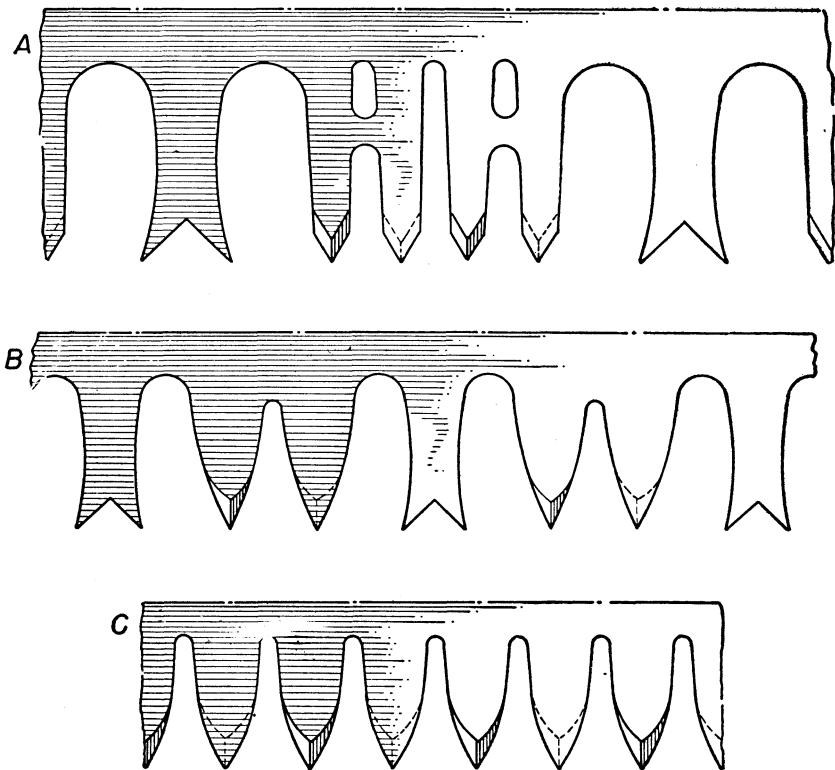
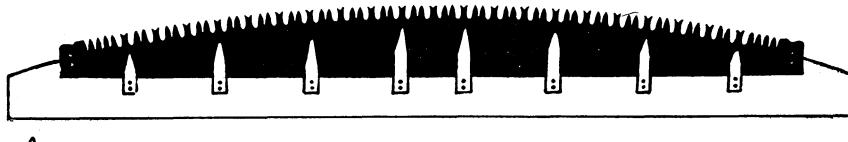
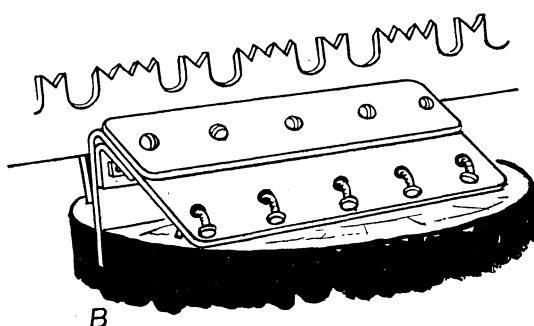


FIGURE 6.—Types of crosscut saw teeth: *A*, For softwoods; *B*, for hardwoods; *C*, for dry wood only.



A



B

FIGURE 7.—Saw-filing clamps: *A*, For crosscut saw; *B*, for bow saw.

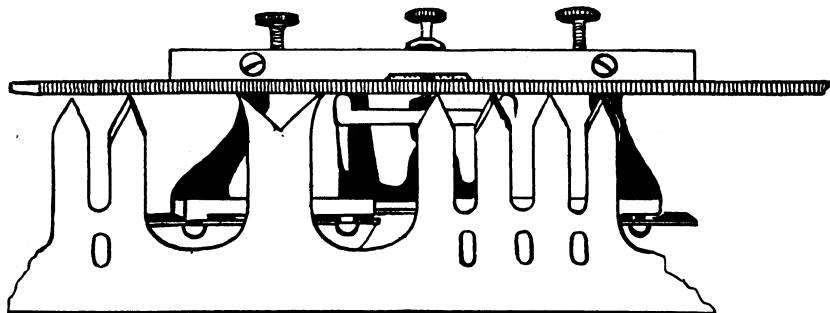


FIGURE 8.—Filing the cutting teeth down to the same height. The file is held in a jointing tool. This jointing tool is for a crosscut saw.

properly set for height, is placed on the saw so the raker protrudes through the slot, and the raker is filed down even with the plate. The rakers of a crosscut saw are filed down one-fiftieth of an inch below the cutting teeth for softwoods and one-sixty-fourth of an inch for hardwoods. Bow-saw rakers are filed down one-fiftieth of an inch for

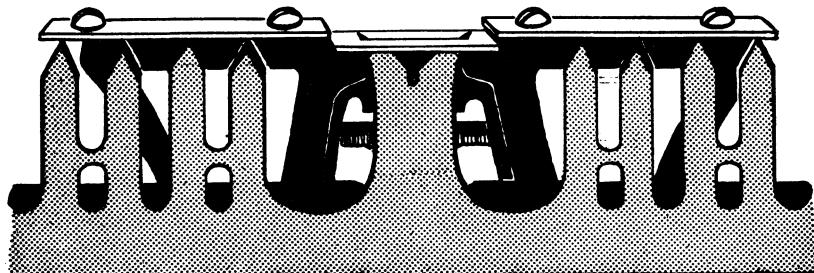


FIGURE 9.—The jointing gage fits over the crosscut saw rakers.

softwoods and one-eightieth of an inch for hardwoods. After the rakers are filed down, each side of the V in the top of each raker is filed straight across until the flat top left by the jointing is removed (fig. 10).

Next the cutting teeth are set (fig. 11). This involves bending every other tooth out opposite the beveled face, and then turning the saw

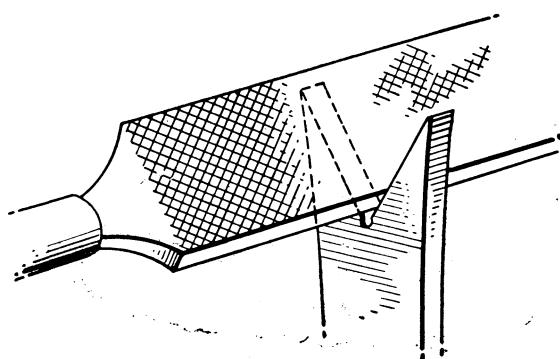


FIGURE 10.—Sharpening a raker tooth.

around and bending the other teeth in the opposite direction. This must be done carefully, so that when the setting is finished the teeth on each side will cut in line. For a bow saw the set is placed in the entire tooth, and setting pliers are specially made to do the job. For a crosscut the set is placed in only about the top third of the tooth. A hammer and small anvil are the best tools for this purpose. The correct set is tested by a set gage, or "spider," the upper prong of which is held against the point of the tooth (fig. 12). If the gage can be rocked from side to side the set is not enough; if it can be rocked up and down the set is too great.

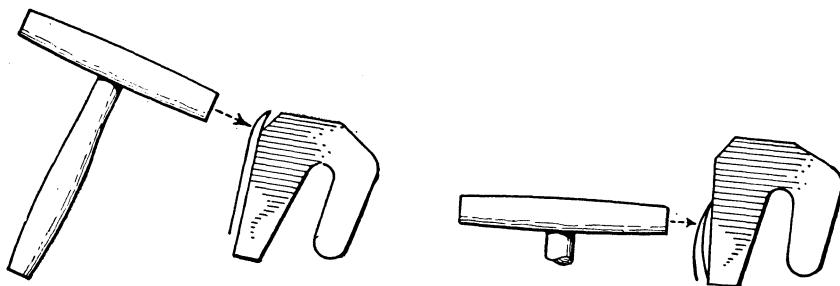


FIGURE 11.—Putting the set in crosscut-saw cutting teeth. At right, correcting a tooth bent too far.

Finally the cutting teeth are sharpened. In this operation the beveled sides of the faces of each tooth are filed back. Be careful to keep the same bevel, and file just enough to eliminate the flat place left on the top of the tooth by the initial jointing (fig. 13).

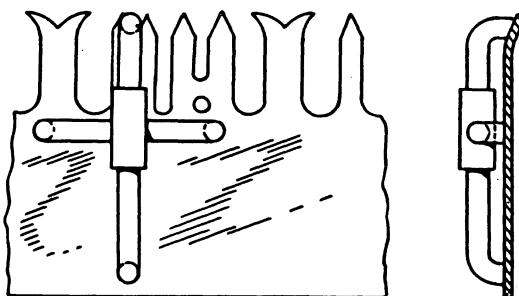


FIGURE 12.—Testing the set with a gage, or "spider."

The whole filing job must be done carefully and accurately if the saw is to cut easily. It is not to be expected that anyone can become a good filer merely by reading a set of sketchy instructions, but with practice and experience based on these instructions almost anyone can improve the cutting of a dull saw. More detailed instructions are given in booklets put out by saw manufacturers; they may be available at your hardware store.

Sawing technique with the two types of saws varies somewhat. The crosscut saw is pulled straight back and forth into the cut. The belly in the blade makes it bite into the wood. When two men are working, the sawyer who has just pulled his end lets his hands ride

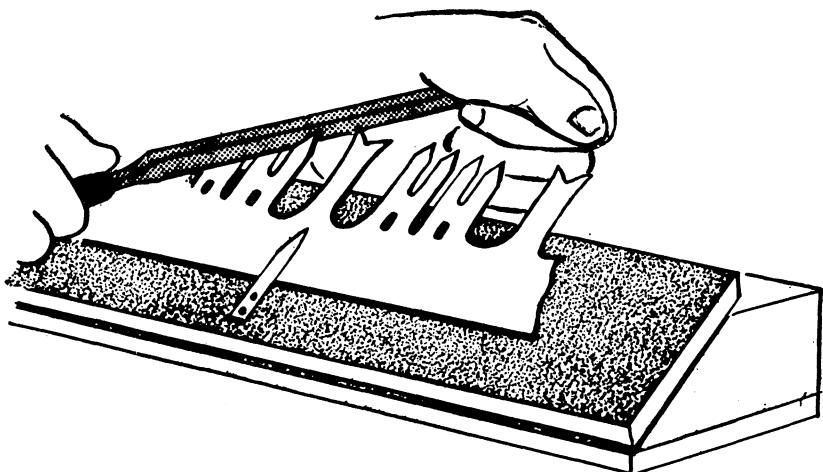


FIGURE 13.—Filing the cutting teeth.

back easily. The entire length of the saw blade is used, in order that the saw can free itself of the shavings. It is important to keep the saw straight. A curved or crooked cut makes for hard work.

With the bow saw, the saw is rocked 2 or 3 inches so that it is sawing continually on a corner. In bucking, the handle end is raised on the forward stroke. On the backward stroke it is lowered again. This reduces the tendency of the saw to chatter, and makes for faster cutting (fig. 14).

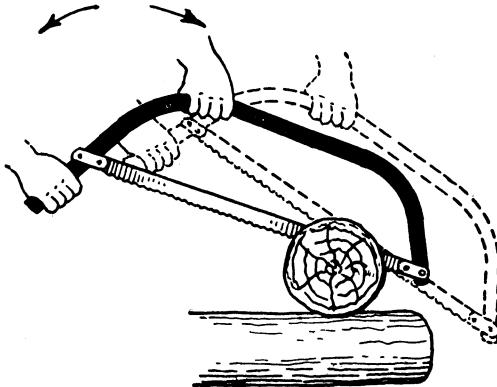


FIGURE 14.—The bow saw works best with a rocking motion.

In sawing pitchy woods such as pine or spruce—with either type of saw—pitch may accumulate on the blade and make the saw hard to use. Frequent applications of kerosene to the blade will dissolve the pitch and make the saw work more easily. A bottle with a bunch of pine needles stuck in the neck makes a good applicator.

Both the bow saw and the crosscut are sharp-edged tools, and they can make nasty wounds. The blades should be treated with the care

and respect they deserve. When transported in a motor vehicle they should be placed in a rack or plywood guard. When carried around in the woods the teeth should be away from the body. The crosscut is best carried across the shoulder with the teeth away from the neck, and the back handle removed so it will not catch on anything. The bow-saw frame can be hung over the shoulder, with the toothed edge of the blade toward the back.

Special care should be taken to see that other people are not injured. A man carrying a crosscut saw across his shoulder should not turn unless he is sure no one is within the sweep of the blade. When inserting a new blade in a bow saw, make sure that no one is in front of it so as to be in danger if the blade snaps loose from its mooring rivets.

Power Saws

A number of power saws have become available in recent years. Among them are circular saws, drag saws, and chain saws. Many of them are suited for use on farm logging jobs.

The chain saw is the type most generally useful in the Northeast. This consists of an endless link chain, somewhat like a bicycle chain, with teeth protruding from the outer edge. The chain, powered by either a gasoline or electric motor, is held in position by a guide bar.

Two-man chain saws have been on the market for several years, and they have been improved steadily. They are made in many different sizes, some big enough to cut timber 12 feet in diameter. Al-



FIGURE 15.—A five-man chain-saw crew.

though two-man chain saws cost \$500 or more, and are generally bigger and heavier than necessary for cutting the timber on the ordinary farm wood lot, thousands have been purchased by northeastern farmers in recent years. They make the work of wood cutting much easier. Many an older man finds pulling one end of a crosscut saw too hard work, but is fully able to handle one end of a chain saw.

For most efficient operation the two-man chain saw should be used by more than a two-man crew. When only two men take it into the woods they are actually sawing only about a quarter of the time. The rest of the time they are notching, limbing, swamping, and moving from tree to tree. Despite the fact that the saw will cut about twice as fast as a crosscut, total production is increased only about 15 percent. Addition of another man to the crew—or better yet, two or three men—to do the ax work makes it possible to use the chain saw a greater part of the workday, and take more advantage of its cutting ability (fig. 15).

The two-man saw is too big and heavy for the timber to be cut on many northeastern farms. Consequently most manufacturers have been trying to develop lighter and less expensive saws. Several one-man saws have recently become available (figs. 16 and 17). These will cut timber up to about 20 inches in diameter. They cost between \$300 and \$400. Most of them weigh between 30 and 50 pounds, but there is one electric-powered saw that weighs only 18 pounds. However, this requires a motor-generator unit to run it that weighs 129 pounds. The whole outfit costs about twice as much as a two-man gas-



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FIGURE 16.—One-man gasoline-powered bow-type chain saw.



FIGURE 17.—Proper method of cutting with one-man chain saw. The bumper plate is held firmly against the log.

oline-powered saw, and is rather expensive for a farmer unless he has other uses for the generator.

A gasoline-powered chain saw is a piece of precision equipment, and as such it needs the same careful maintenance and attention that other new farm equipment requires. Each saw, when purchased, is accompanied by a detailed instruction book, which is usually written in clear, simple English, and well illustrated. These books should be studied carefully, and every effort made to follow their instructions as closely as possible. Don't pay any attention to neighbors or local mechanics who advise a different mixture of oil and gasoline in the tank, or a "hotter" spark plug than prescribed by the manufacturer of your saw. Such changes almost certainly will not improve performance, and they often damage the machine.



F-419294

FIGURE 18.—A wheel-mounted circular saw. For felling trees, the saw can be swiveled to a horizontal position.

Preventive maintenance simply means keeping the whole machine properly lubricated and tightened up, and replacing worn parts before they break down and cause other damage. Most chain-saw companies are establishing service stations, manned by factory-trained mechanics, at convenient locations throughout the Northeast. It is well worth while to become acquainted with them and to use the services they offer. A letter to the chain-saw manufacturer will get you the name of the nearest service station for your particular make of saw.

Operating a chain saw calls for a somewhat different technique than crosscut or bow-saw work. The main thing to remember is how fast the chain saw will cut. A 24-inch sugar maple can be cut through in about 30 seconds, and a pine of the same size in about 20 seconds. Therefore it is necessary for even experienced cutters to guard against

cutting a tree completely off before they realize it, without proper provision for getting out of the way.

The proper method of cutting with a chain saw is to keep the bumper plate at the motor end tight against the tree being cut, and let this plate take the pull of the saw teeth working against it (fig. 17). It is a good idea to make the cut by holding the bumper plate against the bulge of the stick and then working the tail stock around fanwise. This is more important with the two-man than the one-man units. Pulling the bumper plate around the bulge of the tree against the force of the motor is fatiguing, even with the one-man units.

More pointers on the use of chain saws will be given in the sections on felling and bucking.

The wheel-mounted circular saw (fig. 18) has proved its value in open, level woodlands. It has a frame something like an oversized garden cultivator, with a motor mounted between the shafts. A circular saw is mounted in front of the frame on a swiveled arm so that it can be used either horizontally or vertically. A V-belt or flexible shaft connects the motor and the saw.

These saws are efficient cutting tools, but their use in hilly, rocky, and brushy northern woodlands is both arduous and dangerous. It is hard work to push one of them around all day; besides, if the saw comes in contact with a rock it is almost sure to be ruined, and the operator may be seriously injured. Recently some manufacturers have been putting a clutch between the saw and motor, and have supplied a source of power to the wheels; this aids in pushing the tool around. Even with these improvements, use of such saws in the Northeast will probably be confined to the more open and level woodlands, and to bucking at the landing.

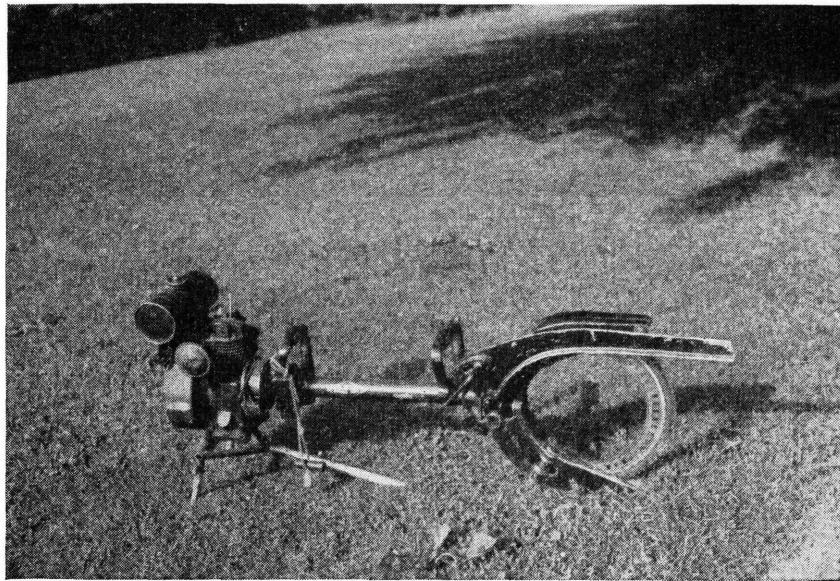


FIGURE 19.—The Sally saw.

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Another type of portable circular saw that can be taken into the woods is the so-called Sally saw (fig. 19). In this, the circular saw has been reduced to a mere flat rim, held in position in the guard by two idler wheels. Holes cut in the rim engage the gear on the end of the drive shaft. The 1½-horsepower motor is of conventional design. There is a clutch, attached to the rear handle, and the saw can be thrown into or out of gear by a slight movement of this handle. The whole saw weighs about 64 pounds.

The Sally saw blade is 16 inches in diameter, but the cutting capacity is about 11 inches. This saw can be used either in felling or buck-



FIGURE 20.—A drag saw.

ing; the saw can be swiveled around to either a vertical or horizontal position. The prop under the motor relieves the operator of much of the weight. Because of its relatively low price, and because the motor can easily be detached and employed for other purposes, the Sally saw is especially good for farm use. With different tooth patterns it cuts small hardwoods and softwoods efficiently and smoothly.

Drag saws (fig. 20) and more sturdily mounted circular-saw cutting-up units are better suited to use on the landing. The drag saw is a heavy crosscut saw blade mounted on a reciprocating arm connected to a motor drive shaft. It is slower than a circular saw, but in a size suitable for cutting big logs it is much cheaper. A number of these saws are used successfully for bucking wood at landings in the Northeast, but very few loggers attempt to take them into the woods for felling.

For small wood a circular-saw cutting-up unit is as cheap as the drag saw, and much faster and more convenient to use (fig. 21). Buzz saws, with a rocking table for cutting up cordwood, have been used for years on northeastern farms. Larger rigs for cutting distillation wood, pulpwood, turning bolts, and even small logs from tree-length poles are being developed.



F-438107

FIGURE 21.—A circular bucking saw.

Wedges

Wedges are indispensable in woods work. A wedge driven into the cut following the saw prevents pinching and makes it possible to complete the cut. In felling, wedges are used to tip the tree in the direction desired. Wedges are also used in splitting wood.

Wooden wedges are frequently used by felling and bucking crews, particularly those working in softwoods. Wooden wedges are cheap. Often they can be made by hand from material available in the woods. Almost any dry hardwood makes a good wedge. The best ones, of course, are made of species like dogwood, ironwood, hard maple, and beech. Wedges made of green wood do not stand up very well. Generally it is better to use a sawed wedge than one cut out with an ax. The roughened surface left by the saw holds better in the cut, and the taper is likely to be more even. A good pattern for a wooden wedge to be used with a crosscut saw is shown in figure 22.

One advantage of the wooden wedge is that it can be driven with the poll of a single-bit ax.

Wooden wedges are also used with chain saws (fig. 23). Since the wedge is apt to come into contact with the moving chain on the back

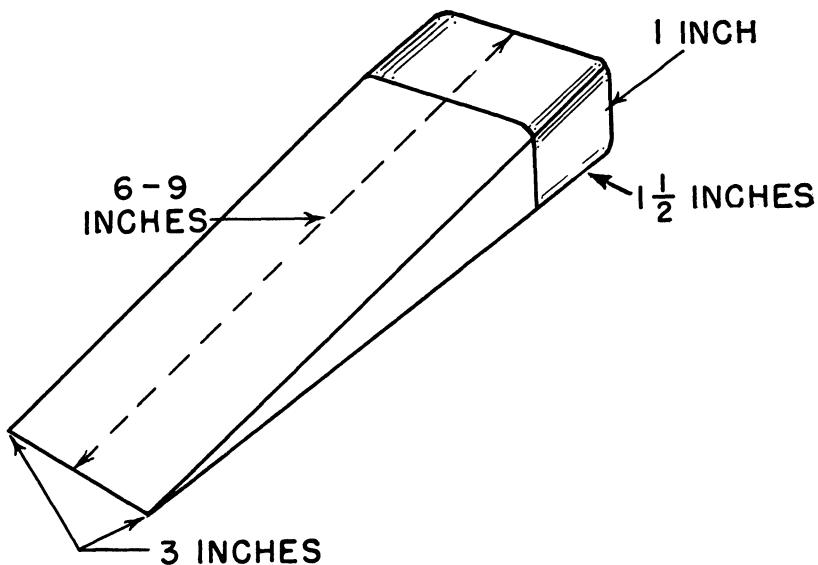


FIGURE 22.—A typical hardwood wedge for felling.

side of the blade, you cannot use a steel wedge with a chain saw; it would ruin the chain. However, wedges designed especially for use with chain saws are made of aluminum and magnesium. The entering edge of the chain-saw wedge should be blunt, so it can engage the sides of the wide kerf quickly.

A good many wooden wedges can be split or broken by a woods crew in the course of a day; so many fellers, especially those working with crosscut saws in hardwoods, use steel wedges (fig. 24). Many types are available on the market, and many steel wedges are made by local blacksmiths, or on the forge on the farm. It is important that the steel wedge be left untempered. Otherwise, when hit with a tempered steel sledge it is apt to spall, and the flying fragments can easily put out an eye.

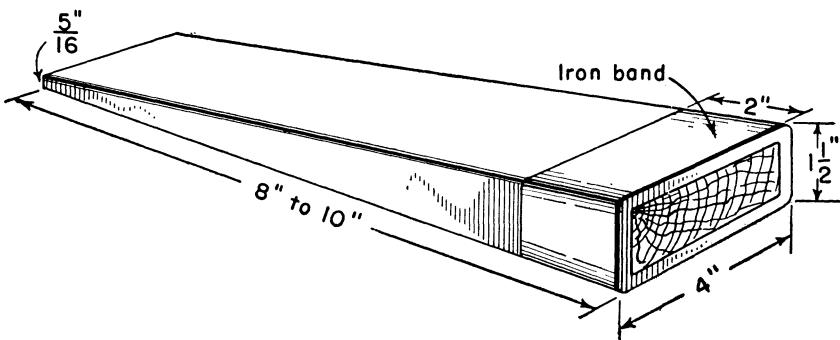


FIGURE 23.—A wooden wedge for use with a chain saw.

A smooth-sided steel wedge is quite likely to kick back out of the cut. Consequently the faces of many commercial manufactured steel wedges are creased, and those of many home-made ones are roughened

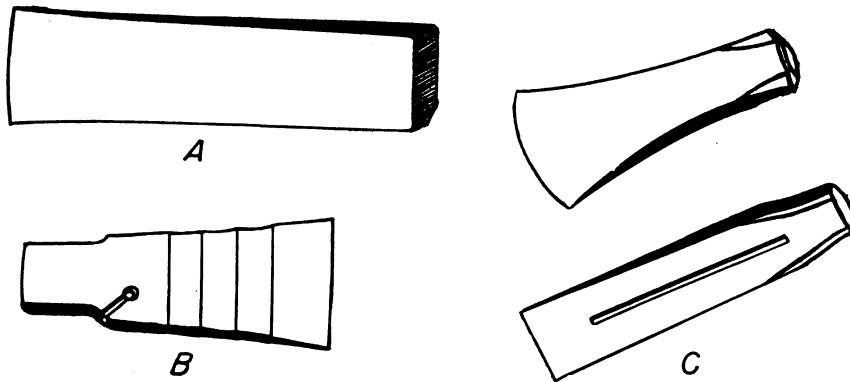


FIGURE 24.—Steel wedges: A, Plain felling wedge; B, creased bucking wedge; C, splitting wedges.

with a cold chisel. In time the head of a steel wedge may become mushroomed by pounding. Wedges in this condition should not be used. The danger of flying fragments from the mushroomed edges is too great. It is easy to put such a wedge back in shape for use, however, by taking off the fanned-out edges on an emery wheel.

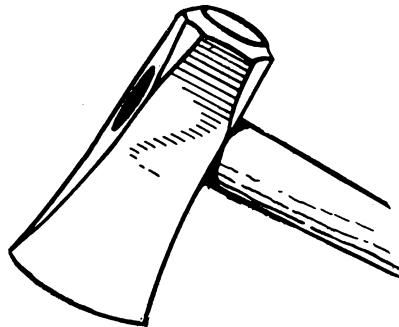


FIGURE 25.—A woodchoppers' maul.

Splitting wedges are ordinarily longer and thicker in the shank than felling and bucking wedges. Some are shaped like a big cold chisel, others like an elongated single-bit axhead. There is also available a splitting maul (fig. 25), which has a hammer face on one end and a wedge-shaped face on the other. These are frequently used in splitting fuel wood.

Explosive wedges are relatively new in the woods (fig. 26). For years some loggers have been splitting tough woods with black powder, by boring holes along the line to be split, tamping in charges of black

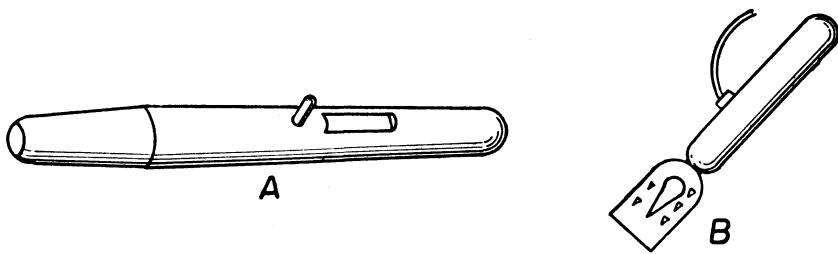


FIGURE 26.—Explosive splitting wedges: *A*, Round type; *B*, flat type.

powder with fuses and wadding, and setting off the powder. The explosive wedge simplifies the job. There are two patterns of explosive wedges. The most popular is a steel cylinder with a hole in the tapered end and a fuse hole along the side. Black powder and wadding are placed in the end hole, and then the wedge is driven into a sound place in the end of the bolt to be split. The wood fibers that penetrate the end of the hole tamp the load tight. Then a fuse is placed in the hole in the side, a heavy bolt of wood is leaned against the driven end of the wedge to keep it from kicking back too far, and the charge is set off. Even the toughest woods to split, like sycamore and elm, can be blown apart by this tool, although there is little control of the direction of splitting.

The other type of explosive wedge has a wedge-shaped blade into which the charge and wadding are tamped. It can be driven into the side of the bolt to be split. A special detachable driving end can be used. This driving end has lugs to which a log chain can be attached to keep the wedge from flying too far when the charge is set off.

Black powder should be kept at a safe distance from any flame or sparks, to avoid the danger of accidental fire or explosion.

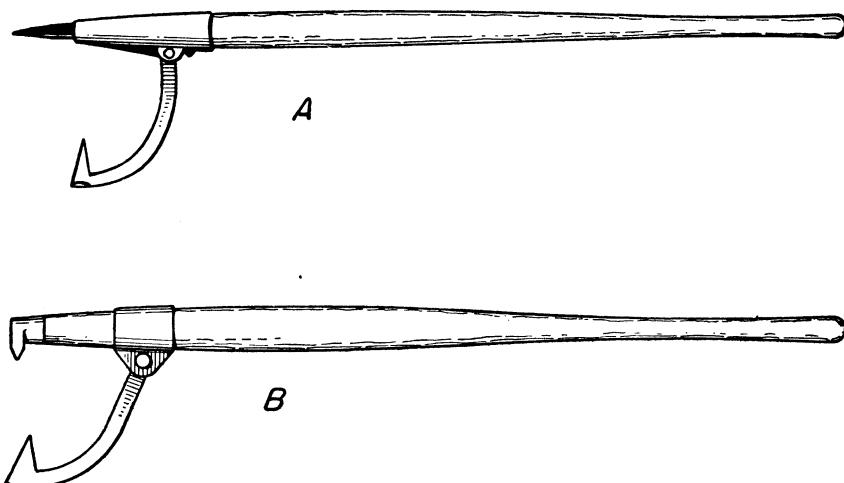


FIGURE 27.—*A*, Peavy; *B*, cant hook.

Peavies, Cant Hooks, and Pulp Hooks

The peavy (fig. 27) is another almost indispensable tool to the logger, especially if he is cutting heavy logs. It is merely a heavy hardwood handle, shod at the lower end with a steel spike and having a dog hinged onto one side. With this tool the logger can roll heavy logs, because the handle gives him good leverage (fig. 28). He can also use the peavy as a pry pole.

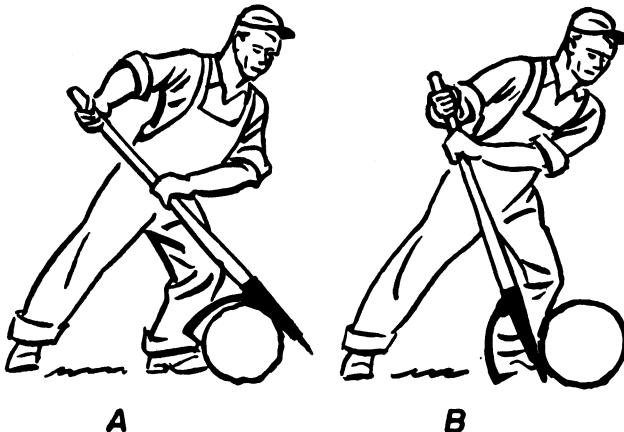


FIGURE 28.—The peavy can be used to roll heavy logs. *A*, Use of the dog; *B*, use of the spike.

Fellers and buckers working in heavy hardwoods use a peavy to roll lodged trees loose, and as a pry pole to avoid pinching the saw when they are bucking logs. Frequently peavies are used to roll the logs around to make the ends visible to the scaler. Peavies are even more useful for getting logs clear of obstructions in skidding, to arrange them on the deck or landing, and to roll them on the truck in loading.

The cant hook (fig. 27) is like the peavy, except that the handle is shod with a flat toe or bill facing the dog. Cant hooks are used somewhat as peavies, but are less frequently carried into the woods. The spike on the peavy makes it a more useful woods tool, since the spike can be stuck into the ground or into a root for prying.

During recent years cant hooks have been adapted for use as log jacks (fig. 29). This is done by welding or riveting a steel support onto the lower part of the handle opposite the dog. Small logs can be rolled over onto this support; this gets them up off the ground for bucking, and eliminates pinching and sawing into the ground.

For short bolts the pulp hook (fig. 30) is a useful tool. This is merely a stronger version of the dunnage or bale hook. The pulp hook is a simple tool, but it is important that it be correctly manufactured. A number of different patterns are made, following the preferences of individual operators. The steel point should be carefully tempered, not hard enough to shatter nor soft enough to broom out in frozen wood. A square or oblong flat-faced point is preferable



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FIGURE 29.—A cant hook adapted for use as a log jack.

to a round one, because it will cut the wood fibers in entering, rather than pushing between them. The handle should be oval so that it will not slip in your hand, and firmly attached so that it will not turn on the bolt.

In use the pulp hook is most safely driven into the end of the bolt, but it can be driven into the side. It is especially useful in breaking ice-covered bolts loose from a pile, but once a worker gets accustomed

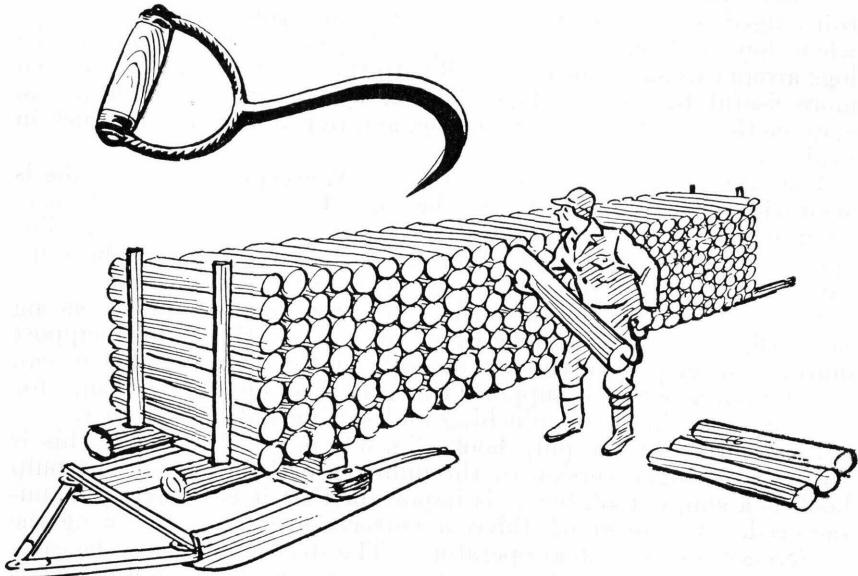


FIGURE 30.—The pulp hook, and how it is used.

to it he can handle pulpwood or other bolts with much greater ease and efficiency than he can with his hands, under almost any conditions.

The pulp hook can be dangerous, however. The operator should stand so that, if he misses the wood, the hook will not strike his legs or body.

Peeling Tools

Hand-peeled wood is very much in demand. Pulp companies are now paying a premium of about \$4 a cord for peeled wood. This is not all clear gain, however, since bark constitutes 10 to 15 percent of the content of a cord of rough wood. If rough wood is worth \$15 a cord and peeled wood \$19, and the species being cut runs 15 percent bark, a cord of rough wood will make only 0.85 cord of peeled wood, worth \$16.15. That leaves \$1.15 to cover the cost of peeling. If a thin-barked species is being cut, for which bark constitutes only 10 percent of the content of a rough cord, it will convert to 0.9 cord of peeled wood worth \$17.10, giving the peeler \$2.10 for his work. On the other hand, peeled wood dries faster, deteriorates less, and is cheaper to haul than rough wood.

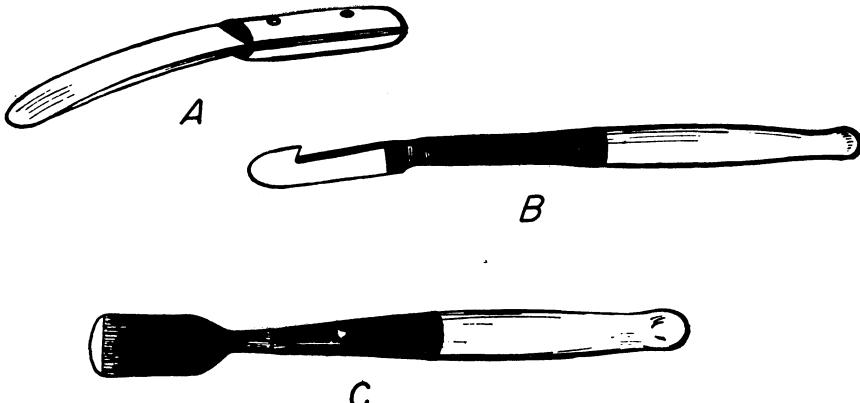


FIGURE 31.—Spuds for peeling off bark: *A*, auto spring spud; *B*, hemlock spud; *C*, commercial spud.

The easiest time to peel wood is in the spring and early summer months when the bark will "slip." The tool commonly used for this work is the spud (fig. 31). There are many patterns of this tool on the market, and in addition many are home-made from old automobile springs. Essentially the spud is a slightly curved piece of flat steel, about an inch and a half wide, with a sharpened curved point and a handle. For thin-barked species like spruce, aspen, and fir in small sizes, spuds only 10 to 12 inches long are frequently used. For heavier-barked hardwoods such as birch, cherry, and yellow-poplar, spud lengths are 15 to 18 inches, and for heavier- and harder-barked woods like hemlock and sugar maple spud lengths are often increased to 24 to 30 inches.

The hemlock spud manufactured commercially is about 30 inches long, and has a sharpened notch on one side of the blade, which is used

in splitting the bark around the log at about 4-foot intervals. The bark of hemlock and of chestnut oak is used by plants making tannin extract for the leather industry.

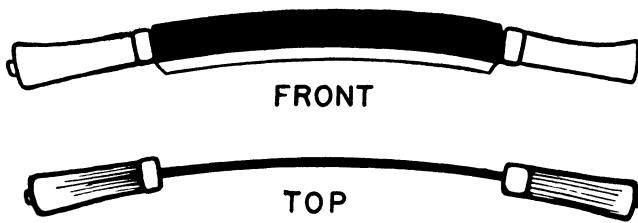


FIGURE 32.—A timbershave for peeling timbers.

For peeling outside the regular peeling season, a sharp-edged tool such as an ax or drawshave must be used. The ax is useful as a rough expedient when a job of peeling a few fence posts is to be done. The carpenter's drawshave is rather light for peeling bark. The drawshave used for round timbers is a bigger, sturdier model. Many loggers straighten out the handles more nearly in line with the blade to give them greater pulling power and to reduce possibilities of skinning their knuckles. A special timbershave with handles straightened out

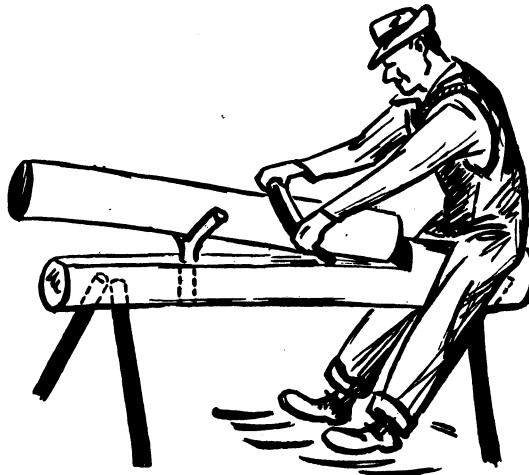


FIGURE 33.—A shaving horse is often used to hold the wood being peeled.

in this way, and a slightly curved blade to give greater contact with a round stick, is on the market (fig. 32). On the Eastern Shore of Maryland and in Delaware flexible-bladed drawshaves, usually made out of a section of old crosscut saw blade, are commonly used. For shaving short bolts, a shaving horse like the one pictured in figure 33 makes the work much easier.

FARM EQUIPMENT USEFUL IN LOGGING**Horses**

Many farm horses, particularly in the northern part of the region, are used in the woods part of the year. The use of horses in the woods is more and more confined to skidding light loads for short distances. Tractors are fast supplanting horses for yarding over longer distances, and trucks have almost entirely replaced them for hauling.

Wheeled Tractors

Wheeled tractors are frequently used in the woods. They are commonly used on commercial jobs in level open woodlands. The usefulness of a wheeled tractor can be increased greatly by mounting a winch on the rear. With a winch it is possible to drag logs out of gullies and other places where a tractor cannot be driven.

Wheeled tractors are somewhat top-heavy; so they are dangerous to use on slopes. They do not have as good traction as crawler tractors. Consequently they are not so useful in the woods, particularly in muddy weather; but on dry ground or frozen ground they are capable of giving a good account of themselves.

With wheeled tractors, some sort of safety hitch should be used. Several good hitches are manufactured, or one can be improvised by using a wooden breakaway pin in a clevis.

Light Crawler Tractors

Crawler tractors do not compact the soil in plowed fields so much as wheeled tractors or horses, and they have greater pulling power. At present the smallest Diesel-motored tractors have about 35 horse-



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FIGURE 34.—Farm trucks can be used to haul logs.

power, and weigh around 3 tons. Gasoline-powered tractors are available in 20- and even 12-horsepower sizes, weighing 3,000 and 1,500 pounds respectively. These smaller tractors are available in both wide- and narrow-gage types.

The farmer who is contemplating spending a portion of his work year on woods operations might well consider the purchase of one of the smaller crawler tractors as a dual-purpose machine, for use both in the cultivated fields and in the woods. A rear-mounted winch adds considerably to the usefulness of a crawler tractor, as with the wheeled type.

Farm Trucks

Many farmers will sell the products of their logging operations decked by the roadside. Others will find that it pays to haul them to the using plant. Most farmers have flat-bed or stake trucks that can be easily adapted to hauling logs or bolts (fig. 34). Farmers who do not have trucks often haul logs short distances on a cart or wagon drawn by a rubber-tired tractor.

SPECIALIZED LOGGING EQUIPMENT

In addition to equipment that you may have or may get for use on your farm, there is specialized equipment that is useful for handling heavy timber or large quantities of timber. This includes the larger crawler tractors equipped for logging with dozer blade, winch, and arch; cutting-up plants, conveyors and cranes for loading (fig. 35), peeling machines, and specially equipped logging trucks (fig. 36).

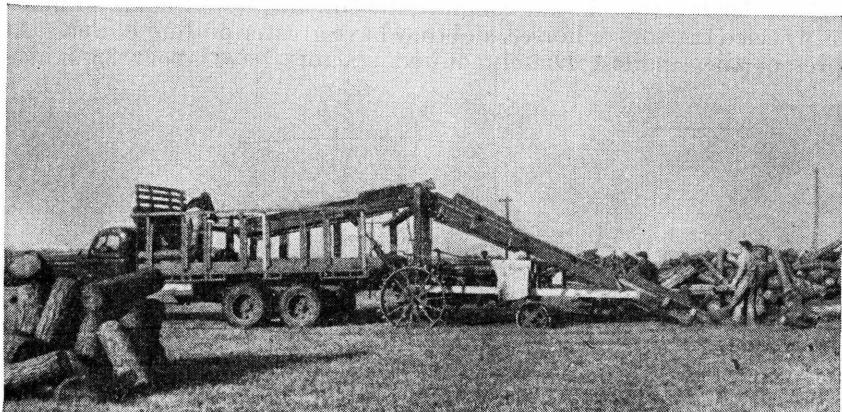


FIGURE 35.—Pulpwood loader

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Although much equipment of this kind is too expensive for the average farmer to buy, there are ways in which you can get the use of such equipment for logging your wood lot. The most common, of course, is on a contract basis with a commercial logger, either through selling stumpage to him or by contracting the logging job or part of it to him at a set price for the job or per unit produced. When the contract is drawn carefully and fairly, this usually works out well.



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FIGURE 36.—Self-loading truck.

Local foresters are often able to help the farmer and logger in drawing up a satisfactory contract.

Another possibility is the rental of such equipment, with or without an operator, from a private owner or from an agency such as the local soil conservation district. A third possibility is the cooperative purchase of items of equipment for their joint benefit by a group of farmers or woodland owners.

LAY-OUT OF THE LOGGING JOB

PERMANENT IMPROVEMENTS

Although the farmer cannot afford to do many of the things that a commercial logger can, he should consider a few permanent improvements in his wood lot to make the logging job easier and more efficient.

The farmer will rarely have to consider building a camp in the woods for men or livestock, but an investment that is worth while, particularly in the northern regions, is a simple warming shelter. This can be a semipermanent or—even better—a portable building with a little stove in it. It can be used at lunchtime during the winter for protection against the cold and wind. It need not cost more than a few man-days of labor and a few dollars for hardware and roofing, par-

ticularly if it is built of home-grown lumber; and it will be worth far more than it costs. Such a shelter can be invaluable if anyone is injured while at work in the woods.

LOGGING ROADS

Most farmers go into their wood lots year after year, to bring out wood for home use as well as timber for sale; so a little inexpensive work on a logging road will usually be a good investment. A good dry-weather road or a winter truck road can often be developed cheaply in the wood lot, especially if there is already an old road or trail there, that can be fixed up with a little hand work. A local bulldozer owner may bring in his machine on a contract basis and cut a new road at a reasonable price.

The four- and six-wheel-drive trucks commonly used in the woods can travel over a fairly rough road, and can go up 10- to 15-percent grades. However, curves in truck roads should have a radius of not less than 80 feet. If the road has a dead end, space should be provided for a turn-around. Drainage should be provided for along the road and across the road where necessary, so that the road will not wash out. The road should follow a contour line as nearly as practicable. The local forester can usually advise you whether a woods road would be a good investment, and he can help lay it out.

Of course the amount of road building that will pay depends on the situation in the wood lot. Generally it is best to get the truck-loading point close to where the wood is cut; this way the skidding costs are reduced. But in some places it may be better to skid a longer distance and not to put as much work into building a road. It may be wise not to use your woods road at all during the spring muddy season.

In computing the cost of a road, logging operators base their costs on the amount of timber to be logged. For example, a \$5,000 road built into the woods to bring out 5 million board feet costs only \$1 per thousand board feet. The same road built to bring out 50 thousand board feet would cost \$100 per thousand.

SKID TRAILS

A network of permanent, well-laid-out skid trails in a wood lot will make logging easier; and it is one of the first steps in good wood lot management.

Many farm wood lots in the Northeast already are laced with old skid trails, relics of former logging jobs. Often these are well located for additional logging, and need only a little cutting of brush to be useful again. Others are no longer well adapted because of changes in the location of main roads or because of poor original location. Sometimes the old skid trail was located straight up and down the slope, and water washing down it has made it a gully.

The distance between skid trails will depend on the topography of the land and on the skidding device to be used. Under favorable conditions, a tractor equipped with a winch can bunch logs over a radius of 75 feet. Consequently, trails for tractor skidding can be located 150 feet apart. For skidding with horses, trails should be about 60 feet apart.

Trails for horse-skidding of short logs, or for transporting bolts on drays or scoots, may be narrow and relatively crooked. For tree-length logging with horses or medium-sized tractors the trail needs to be straighter and wider. A gentle down grade will make it possible to bring in the maximum loads. Upgrade pitches or even level places will cut down materially the amount that can be skidded. Swampy places, rocks, and stumps in the trail will be a source of endless trouble. A good lay-out for gentle slopes, one for steep slopes, and a poor lay-out are shown in figure 37.

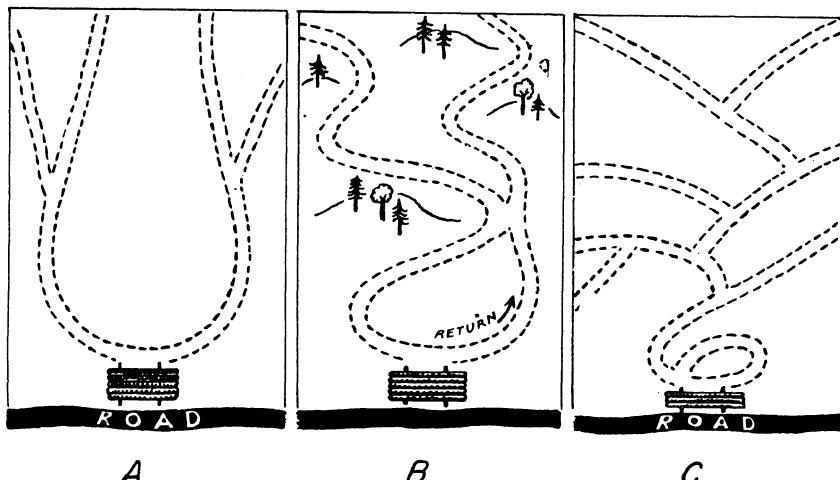


FIGURE 37.—Skid trail lay-outs: *A*, Good lay-out for gentle slope—straight trails, moderate curves; *B*, good lay-out for steep slope—zigzag path to reduce grade; *C*, poor lay-out for gentle slope—sharp curves, unnecessary skidding.

Ordinarily, brushing out and some simple grading work are all that is needed to construct a skid trail for horses. In some cases it will be desirable to install fender logs to keep the load from rolling off the trail on a side slope, or to assist it in getting around some obstruction (fig. 38).

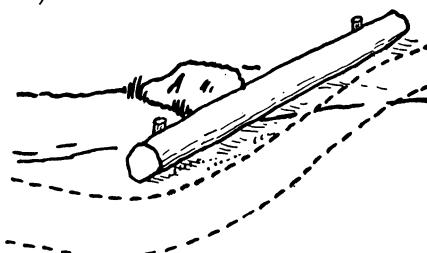


FIGURE 38.—A fender log helps to skid around obstacles.

A little forethought in locating a skid trail can often avoid going through thick patches of valuable reproduction, or permitting loads to rub against and scar valuable trees that should be saved for future growth.

Washing-out of the skid trail can be reduced by installing water bars ("thank-you-ma'ams"). These are ridges of dirt across the trail to divert the water to one side. Open-top pole culverts can also be built across the trail. Brush and limbs can be thrown on slopes in the trail after logging has been completed to help prevent washing of the soil. A 10-foot mat of limbs about every 50 feet, with tops uphill and in close contact with the ground, is recommended.

LANDINGS

Ordinarily the skid trail will come out to a place where the logs or bolts can be loaded onto a truck. Such a landing should be in a clearing, with space enough for piling the wood that is skidded to it. There should also be space enough for the skidding equipment and the loading equipment to turn around. Nowadays much of the bucking is done at the landing, either by hand or by machine. Tree stems are skidded in entire and are cut up into logs and bolts in one operation. This takes room at the landing, too.

Much small wood (pulpwood, mill-wood, and fuel-wood bolts) is piled directly on the ground, either in ricks or in rough-and-tumble

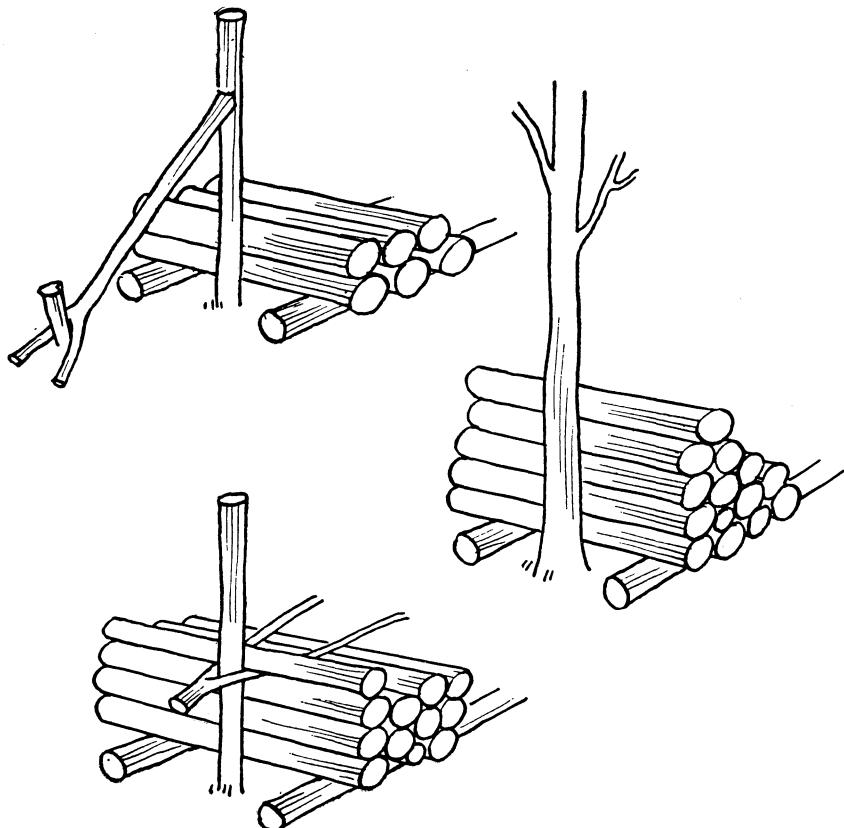


Figure 39.—Methods of erecting rick-piles.

piles (fig. 39). Ricking the wood makes it possible to measure the overall dimensions of the pile (a standard cord is 128 cubic feet of stacked wood, usually a pile of 4 by 4 by 8 feet). Rough-and-tumble piled wood occupies more space, and cannot be measured accurately.

When wood is to be stored for any length of time it is advisable to get it up off the ground. This can be done easily with rickcd piles by laying down a couple of skids lengthwise and building the pile on them. This provides air circulation under the pile, which hastens drying and makes the wood lighter to haul; it also reduces the possibility of rot, stain, and insect damage. The ends of a rickcd pile can be held vertical by standing trees, stakes supported by crotched props, or by crotches tied into the pile.

A method of ricking that has long been used in the South, called "penning," is now being used in some places in the Northeast. The wood is stacked in the form of a hollow square, log-cabin style. It hastens drying even more than the rick, but is a poor unit of measure.

There are also methods of bundling short wood that offer economies in measuring and handling, especially if equipment is available for handling heavier weights. Pallets are often used in forming bundles. Pallet racks for short wood are generally built in the shape of a U. The most successful ones are of tubular steel. One company in the South is using such pallets in which to rick wood at the stump (fig. 40). These pallets can be skidded to the roadside, and then pulled up a ramp onto the truck with the aid of a winch behind the cab. Attempts to build similar pallets out of wood have been less successful because of strength limitations.

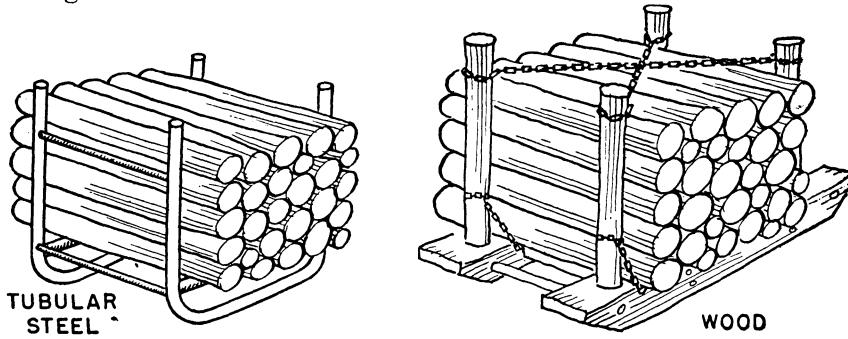


FIGURE 40.—Pallets for bundling short wood.

A number of different methods of bundling short pieces of wood are being tried. One fuel-wood operator in Connecticut bundles fireplace wood with steel strapping for the city market. Several pulp-wood companies are also trying this method, but the steel strapping is expensive and is not reusable; in fact, its disposal at the point where the wood is used is a problem. The wood must be reasonably dry before it is strapped, or it will shrink and the bundle will come apart. More promising are the cable loops, with automatic dogs that tighten each time the bundle is lifted (fig. 41). They can be used again and again. It is quite possible that several northeastern pulpwood companies will supply them to their operators, or require that the wood be piled in such a way that a cable loop can be passed around it before

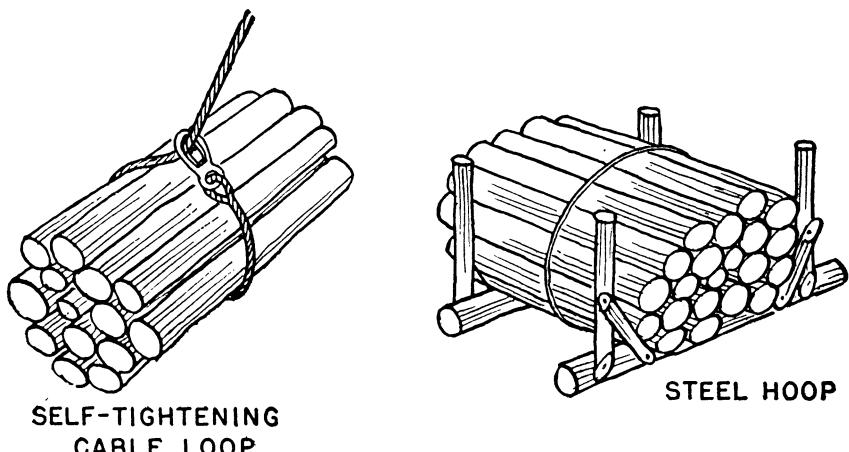


FIGURE 41.—Use of cable loop and steel hoop in bundling.

it is loaded. Another method of bundling is the use of a welded steel hoop. Two pulp companies in New York State are using these. The hoop is propped upright, the wood is piled within it, and the last few bolts are pounded home with a sledge to make the bundle tight.

Logs are also frequently stored at the landing until they can be hauled away. It is not safe to leave logs on the ground for any length of time, especially in the summer months. They will deteriorate quickly. It is wise to place them on skids so that air can circulate under them.

SKIDWAYS

Skidways (fig. 42) can be used both as a place for storing logs at the landing and as a deck for loading logs onto a truck. In hilly country the skidway (also called a "brow") can usually be built on a slope so that the logs can be rolled onto it directly from the skid trail above, and then off onto the truck.

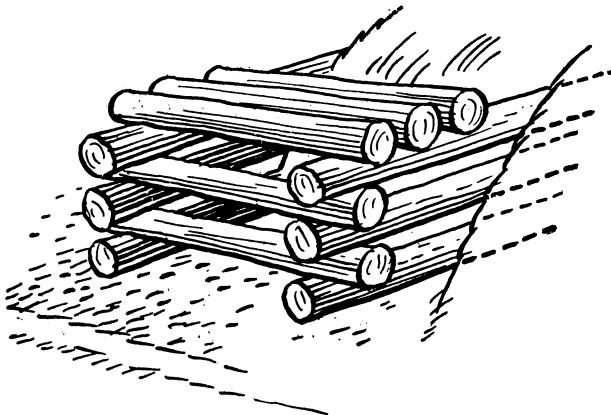


FIGURE 42.—A hillside is a good place to build a skidway.

The skidway should usually be constructed of unmerchantable material, so that valuable material will not be left after the loading is completed. When the skidway is filled, care should be taken that the front log is blocked or held in place so that it will not roll off into the roadway and perhaps on someone or some equipment.

Double-decked skidways are also popular in the Northeast (fig. 43). These make it possible to roll the first tier or two of logs onto the truck from the bottom deck, and then complete the third and even fourth tier from the upper deck, without any uphill rolling.

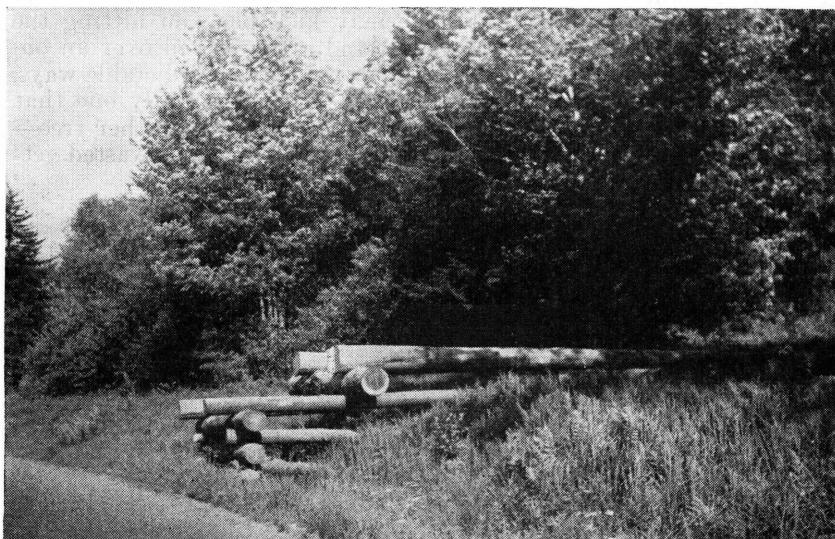


FIGURE 43.—A double-deck skidway.

FELLING

The first step in felling is to select the trees to be cut. For the farmer who wants to keep his wood lot producing, a forester can be a great help in this. In many States publicly employed foresters are available to help the farmer mark the trees to be cut in his wood lot, and to help him find a market for the products. Your county agent can tell you if there is such a service in your locality. If there is not, you can study up on the subject with the aid of one of the bulletins on wood lot management that have already been mentioned; or you can attend local demonstrations of wood lot management that are conducted by Extension Service specialists.

The second step is to decide the direction in which to fell the tree. Generally a small tree can be pushed over in any direction. The choice will depend largely on putting it down in a position where limbing and bucking can be done most conveniently, and where it can be skidded out most easily. Tops should usually be kept out of the skid trail, because if they are put there it will become necessary to rehandle all the limbs to get them out of the way after they have been cut off. The tree should not be dropped in a place where it will be broken up

by falling over stumps or rocks, or where it will be inaccessible because it bridges a depression or is tangled up in thick brush.

With big trees there is sometimes less choice. Some trees, because of pronounced lean or because of heavy limbs on one side, can be felled in only one direction. Even with these, however, by judicious wedging or holding of the corners (which will be described later) the direction of fall can be changed as much as 30°.

Try to avoid felling a tree in the direction of others having dead limbs. Such limbs may be knocked loose and catapult back toward the cutters. They are called "widowmakers," and rightfully so. A tree felled straight up a steep slope may kick back on hitting the ground, endangering the felling crew; and a tree felled over an obstacle, such as a log or rock, may thrash around in unpredictable ways.

Avoid felling a big tree toward another tree, especially one that has a heavy crotch. It is sure to become lodged in the other tree—"sky-hung" the loggers call it. Half a day may easily be wasted getting such a lodged tree down.



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FIGURE 44.—Testing direction of an undercut.

Trees being felled should not be dropped into patches of valuable young growth. They can be responsible for an astounding amount of damage to the future crop. And finally, big trees dropped straight down a steep slope or over rocks, logs, or other obstructions are apt to break, even though they are sound; this reduces the merchantable content materially.

To sum up: Try to pick a place to fell your tree where it will not bring down a shower of dead limbs, or become lodged; where it will do a minimum amount of damage to surrounding growth and to itself; and where it can be skidded out most easily, without necessity for switching it around.

To bring a tree down in the direction desired, first make an undercut on the side toward which it is to fall, approximately a quarter of the diameter deep. Most undercuts are made by first sawing out the bot-

tom part, and then chopping down to this cut diagonally with an ax.

The back of the undercut should be at right angles with the direction in which the tree is to fall. This can be tested by placing a double-bit ax in the cut, and sighting down the handle (fig. 44).

Then start the backcut on the other side of the tree, about 2 inches higher than the undercut. If the tree is straight and well balanced,

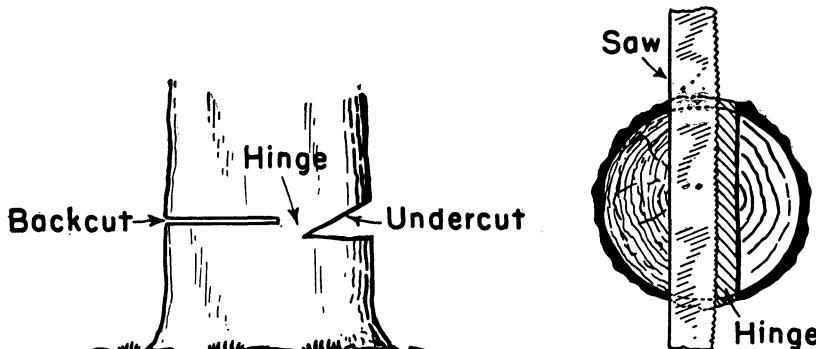


FIGURE 45.—Making the backcut.

saw directly toward the undercut, inserting wedges behind the saw, if need be, to prevent pinching and to start the tree tipping. Do not saw all the way through to the undercut. Leave an inch or two of the wood uncut to act as a hinge when the tree goes over to guide it in the desired direction (fig. 45).

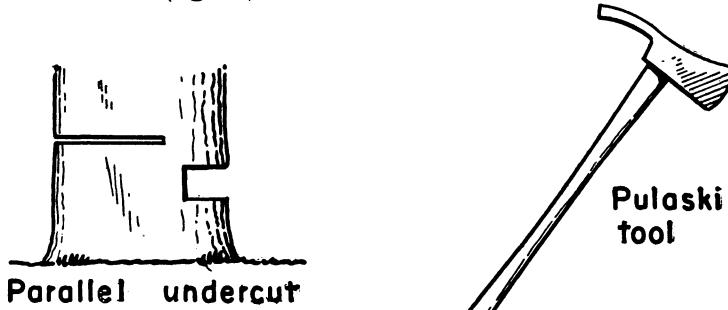


FIGURE 46.—With a chain saw, the undercut can be made with two parallel saw cuts. The block of wood between them can be split out with a Pulaski tool or wedge.

Felling with a chain saw is much like felling with a crosscut. One difference is that most chain saws can cut on an upward slant as well as downwards, so the undercut is sometimes made upside down, with the slanting face at the bottom. This leaves the butt log practically square at the bottom. Some chain-saw operators prefer an undercut made with two parallel chain-saw cuts about 3 inches apart (fig. 46). The block between them can be split out with a Pulaski tool, which has an adze-like blade on the back of a single-bit axhead. If you do not have a Pulaski tool, you can use felling wedges to split this block out.

If the tree being cut leans a little in the direction in which it is being felled it is apt to fall prematurely, splitting up the stem and leaving attached to the stump a slab split off the butt log. This is dangerous, and it destroys valuable material. To prevent it, first make a deeper undercut on such trees, and then "saw off the corners." This means cutting through the sapwood on both sides of the tree before completing the undercut (fig. 47).

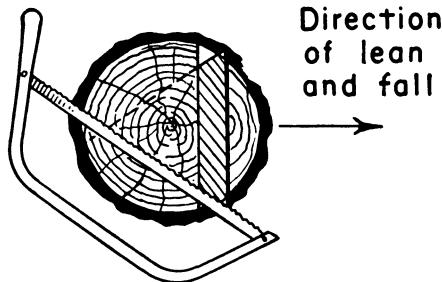


FIGURE 47.—Sawing off the corners.

If the tree leans to one side or the other of the direction in which you want to drop it, you should "hold a corner"; that is, do not saw so close to the undercut on the side opposite the lean, and insert wedges behind the saw on the side toward which the tree leans.

Finally, when the tree is about to go over, give a warning signal to anyone who happens to be around in the woods, who might be injured by the falling tree. Yell "timber-r-!" as loud as you can. Don't assume that you and your partner are the only people around.

DANGEROUS POSITIONS

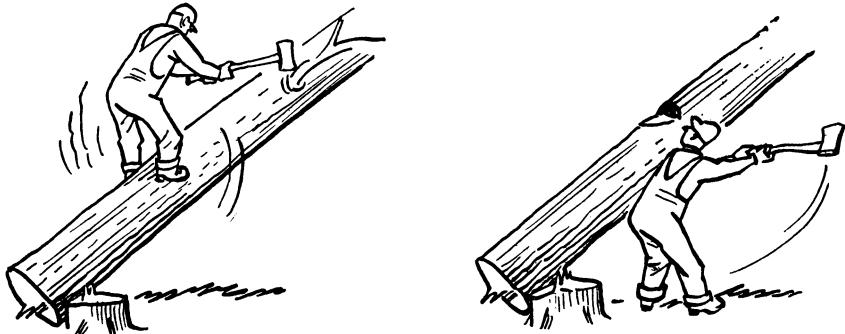


FIGURE 48.—Getting a lodged tree down calls for a cool head and caution.

As the tree goes over, the felling crew should move back from the stump, taking the saw with them. Many a saw has been ruined by being left near the stump of a falling tree. Have a getaway route planned and cleared out in advance—you need not go far. And as the tree goes over, watch the top for widowmakers that might fall on you.

If the tree you are felling becomes lodged in another one, do not lose your head and use up a lot of time and energy uselessly (fig. 48).

Even the best of fellers sometimes lodge a tree. First study the situation carefully, sizing up how seriously the tree is lodged. If it is not lodged too seriously—just caught in the ends of the limbs of another tree, for example—it is often possible to roll it out with the aid of a peavy. If it is hung a little more solidly it can usually be jarred loose by dropping another tree across the stem (about half way up) of the one that is lodged. More solidly lodged trees need to be pulled out. If the felled tree is not too big it can sometimes be pulled back by hand or pried back with a lever or pry pole. Solidly lodged big trees sometimes have to be pulled loose with a tractor or a team of horses.

LIMBING

For most trees limbing is most easily done with the ax. Big limbs, particularly on hardwoods, can be cut more easily with the crosscut or power saw, but it is a waste of time and effort to use these tools on small limbs.

If the tops of any small saplings have been pinned down by the falling tree, and are bowed over, be careful how you cut them. Cut off either at the top or at the butt, the sapling may spring up with great force. Loggers have been known to get broken jaws by being in the wrong place when this happened. Try to pull the top of the sapling out from under the felled tree. If this cannot be done, a light creasing stroke at the top of the bow may allow the fibers to split, releasing the tension. If you cut the sapling off at either end, be careful to chop from the inside of the bow and stand out of the way when the sapling springs up.



FIGURE 49.—Right and wrong positions for limbing.

Limbs are most easily cut by an ax stroke parallel with the tree stem from the base of the tree upward. If possible the axman should stand on the opposite side of the stem, and chop away from himself (fig. 49). Avoid standing on the stem of the tree whenever possible, and never stand on it while another crew is bucking anywhere along it. The stem may drop or roll when you least expect it.

Limbs too big to cut with one or two strokes of the ax should be notched as in felling. The bottom of the notch is cut flush with the stem and the top across the limb at about a 45° angle.

Train yourself to limb closely and smoothly. Projecting stubs make the logs and bolts more difficult and more dangerous to skid and handle; they complicate peeling, if that is to be done; and buyers of forest products discriminate against poorly limbed material.

BUCKING

CHOICE OF LOCATION

Bucking (cutting the tree into logs or bolts) can be done either in the woods or at a landing. If you are cutting big trees, you will probably buck them up into logs in the woods and then skid the logs out.

However, if you are cutting smaller trees, of the sizes usually cut in wood lots in the Northeast, there is no reason why you cannot skid the whole tree length to a landing and cut it up there. One horse or a wheeled tractor can easily handle tree lengths of small softwoods or second-growth hardwoods, even by ground-skidding.



F-448782

FIGURE 50.—A bucking ladder can be used at a landing.

At the landing, you can build a bucking ladder (fig. 50) cheaply and quickly out of material at hand. This will keep the tree stems up off the ground; it will make the cutting easier and will keep the saw from hitting dirt and rocks. Moreover, it will give you a better chance to study the tree stem and to make cuts accurately and at places that will produce the best logs or bolts. If you are handling a large amount of timber, there is a chance to profit from a power bucking rig.

BUCKING SMALL TREES BY HAND

If small trees are to be bucked by hand, either in the woods or at the landing, you should consider the bow saw. This is a tool that is easy to learn to use. If kept in good shape it cuts as fast as any crosscut, and the thin tapered blade eliminates much of the pinching trouble experienced with wider saw blades. Then, too, extra blades can be carried into the woods; should the blade in use be dulled by contact with rocks, the set be taken out of it by pinching, or should it become broken, it is easy to replace it with a sharp blade. Bow-type chain saws are also available, with cutting capacities up to 18 or 24 inches.

A 42-inch bow saw with an extending handle makes a convenient measure for the length of 48-inch bolts, demanded by so many northeastern wood-using industries. If bolts are being cut for an industry demanding 52- or 60-inch bolts it is easy to make a mark on the frame for the length over 48 inches and roll the saw over on its handle to get the correct measurement.

If the tree is to be bucked in the woods it is a good idea to measure out and mark the bolt lengths on the entire stem, and then decide which is the most convenient and easiest place to start cutting to avoid pinching or sawing into the ground. Sometimes it is a good idea to leave the limbs under the tree uncut until after bucking, to keep the stem off the ground and to reduce swaying or rolling. Small tree stems, or substantial parts of them, can be moved around with relative ease. If the butt is still resting on the stump, leaving the stem suspended in the air, it can be cut and rolled or pushed off. The stem can often be lifted onto a block or prop or pulled around to get it away from rocks, brush, or ground where it would be hard to work.

BUCKING BIG TREES BY HAND

Bucking large trees by hand calls for harder work and more knowledge. There is usually a choice in the lengths into which trees can be cut. Standard sawlog lengths in the Northeast usually run from 8 feet to 16 feet, by 2-foot intervals. Generally the longer logs bring the higher prices. There is sometimes a market for logs longer than 16 feet for barn timbers or other specialty uses, which bring even higher prices. The farmer-logger should be familiar with local markets and their specifications, and cut his trees up in such a way that he will get maximum value for them.

There are other things besides length to consider in dividing a tree stem into sawlogs. Generally buyers pay for logs on the basis of net scale, deducting for sweep, crook, and defects that reduce the useful content of the log. Consequently logs should be as straight as possible. Often the effect of crooks can be reduced by making the cuts

at the point of crook, leaving reasonably straight logs on either side. Surface defects like fire scars or old surface wounds will be less serious if they are at the butt of the log, where they will come off in the slab. Where crotches occur, the cut below them should be made below the point of union, so that there is no included bark left in the top of the log; and if there are logs above the crotch the butt of each should be cut just above the union, so that as little wood as possible is wasted.

More and more mills in this territory are buying their logs by grade. This gives the farmer who has good logs, intelligently cut, a price advantage in marketing the products of his wood lot. It is a good idea to find out if any mill in your neighborhood is buying on this basis, and if so and you have good logs, find out their specifications and then plan your cutting to produce the highest grade material.

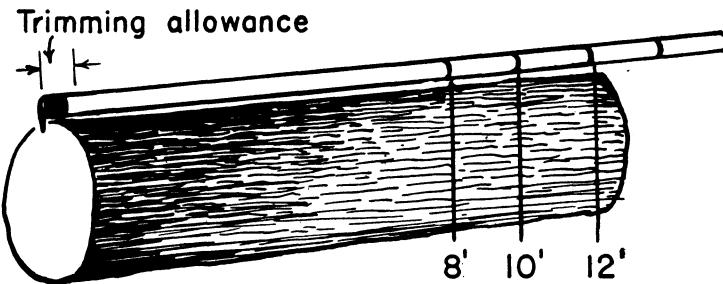


FIGURE 51.—A measuring pole for logs.

Log lengths should be measured accurately, leaving the required trimming allowance on each one. Ordinarily at least 3 inches is called for on each log under 16 feet long to allow for squaring up the boards and removing checked ends. It is a good idea to have this trimming allowance measured off on the butt end of your measuring stick, with the required log lengths indicated at the top. In this way the trimming allowance will be automatically provided for on each log cut (fig. 51).

In bucking large trees there is little possibility of switching the tree stem around, as there is with smaller material. Sometimes, when a logical cut comes alongside a rock or hummock where it would be impossible to saw, the next higher length can be cut first, and the long log moved into a better position with pry poles or a peavy. When bucking on a hillside, guard against the possibility of the bucked log's rolling down onto the cutter on the downhill side. A block placed under or alongside the length to be cut off will usually prevent this.

Wedges are an absolute necessity for bucking large trees in the woods with either power or crosscut saws.

BUCKING WITH POWER SAWS

Almost every farmer is familiar with the buzz saw for bucking sticks into fuel-wood length. Thousands have been constructed on northeastern farms, using second-hand or new motors and a wooden frame. Mandrels and saw collars are available at almost any hardware store or mail-order supply house. Such saws can also be bought



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FIGURE 52.—A home-made buzz saw. A guard over the saw should have been provided.

ready-made with steel frames and independent motors, or designed to be run off a farm tractor or the jacked-up rear wheel of an automobile (fig. 52).

The rocking-table feed for such saws is a favorite for converting 4-foot bolts into 16-inch lengths for fuel wood. Most 4-foot bolts can be handled easily by one man. However, many farmers are now cutting and bringing in longer sticks from the woods, and altering their buzz-saw rigs to handle such sticks efficiently. A simple means for handling lengths up to about 16 feet long is shown below (fig. 53).

The same general idea can be adapted for bucking even longer lengths into short blocks for fuel wood or for the distillation industry and into 4- or 5-foot bolts for pulpwood or millwood. Many farmers

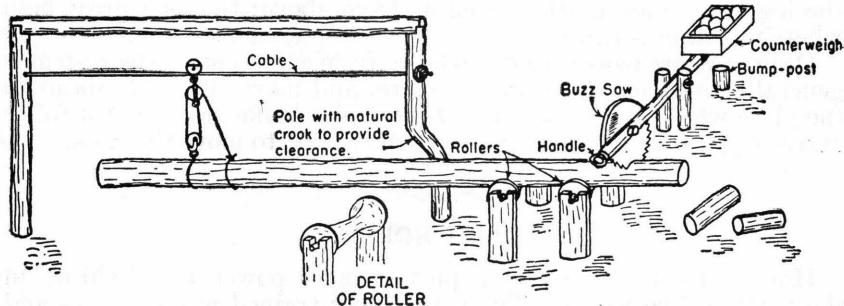


FIGURE 53.—Sling for handling long poles.

have found that one of the wheeled circular saws can be easily adapted to bucking. The small motor provides ample power to run the saw, and the pole can be pushed ahead by hand over wooden or steel rollers (fig. 54).

Other more elaborate bucking plants are becoming commonplace on commercial logging jobs in the Northeast, but they are generally larger and more expensive than the farm wood lot job needs.

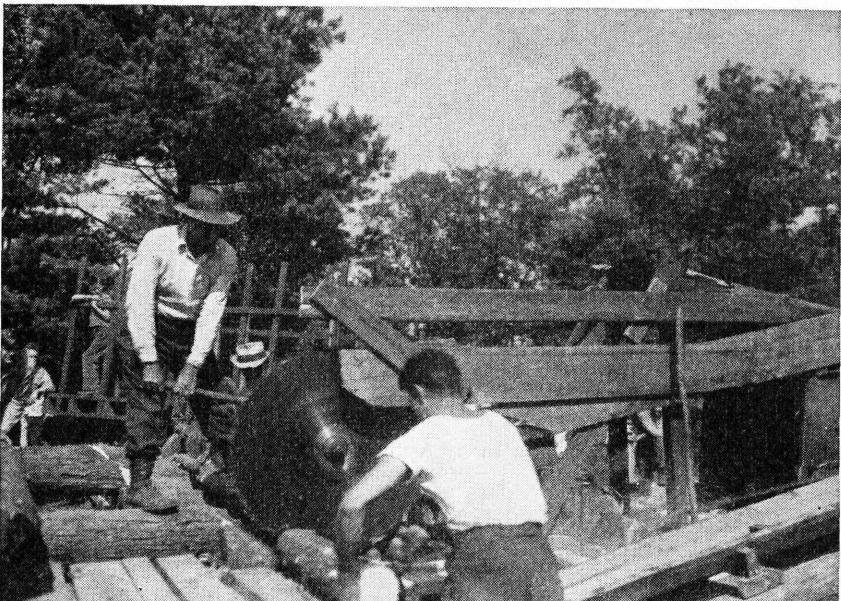


FIGURE 54.—A rig for cutting up tree lengths. The saw should be equipped with a guard.

Chain saws are commonly used for bucking larger trees in the woods and at the landing. The chain saw is commonly used with the log resting on three or more widely spaced skids, which keep it up off the ground and help avoid pinching. If these are placed on a slope it is easy to roll the cut logs off the skids and down onto a skidway or deck from which they can be loaded. Chain saws can be used to cut the log from underneath as well as from above; this is a great help where pinching is expected.

Drag saws are more difficult to move from cut to cut, so the system is generally to mount them in one place, and move the stick ahead to the place where it is to be cut. One popular make has a spiked roller and a buggy on a length of narrow-gage track, to move the stick.

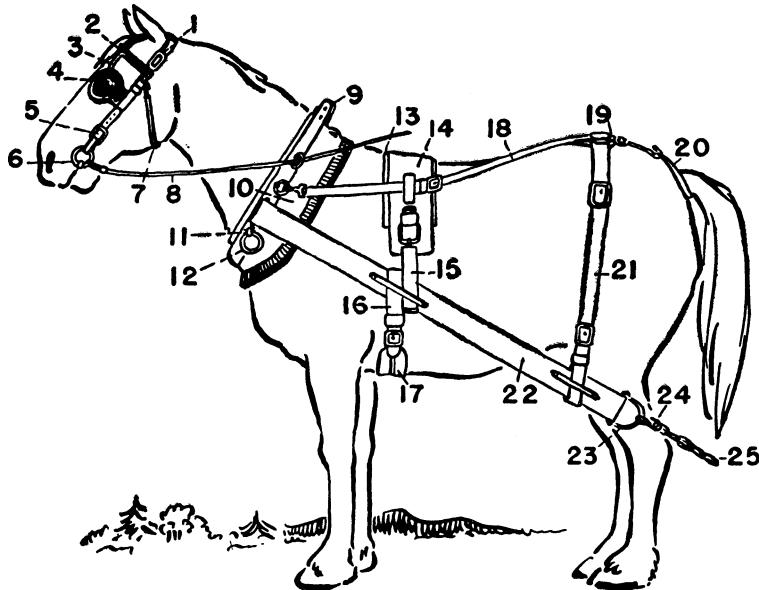
SKIDDING WITH HORSES

Horses are still the most popular motive power for skidding in the northeastern woods. There are many trained woods horses and competent teamsters available, and the horse is well adapted for short

hauls and rough terrain. Frequently the horse becomes so familiar with his job and the spoken commands of his teamster that he works without reins, positioning himself for the log to be hooked on, heading down the skid trail by himself, and stopping again in the correct place on the landing.

Skidding in rough, rocky, and brushy woodlands is difficult work for a horse unaccustomed to it. In ground-skidding, particularly, the load has a tendency to switch around unexpectedly, and the uneven footing and presence of obstacles make it a poor place for a young and skittish horse. On commercial jobs a medium-heavy horse about 5 years old is preferred for woods work.

A good harness for a woods horse to be used in skidding is illustrated in figure 55. It should be properly fitted and of good quality. "Hay-wire logger" is a term of contempt throughout the Northeast, and it originated from a logger who habitually repaired his harness with



SKIDDING HARNESS

- | | | |
|-----------------|--|-----------------------------|
| 1-Crown | 12-Lower Home Ring | 22-Straight Trace |
| 2-Front | 13-Back-Pad Felt | 23-Dee with Detachable Bolt |
| 3-Winker Stay | 14-Back Pad | 24-Pinery Hook |
| 4-Blind | 15-Back-Pad Billet | 25-Heel Chain |
| 5-Cheek | 16-Belly-Band Billet | |
| 6-Bit | 17-Belly Band | |
| 7-Throat Latch | 18-Back Strap | |
| 8-Reins | 19-Breeching Centre | |
| 9-Home | 20-Crupper | |
| 10-Collar | 21-Combined Hip Strap and Trace Bearer | |
| 11-Bolt Draught | | |

FIGURE 55.—Good skidding harness for a horse.

pieces of haywire, which not only ripped out, causing delays, but also injured the horse.

The whiffletree to be used for horse-skidding (fig. 56) should be long enough to hold the trace chains away from the horse's heels. A pinery hook at either end is used for attaching these trace chains; these hooks

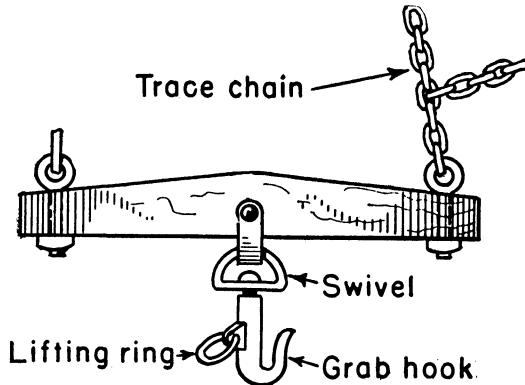


FIGURE 56.—A whiffletree for skidding.

make it easy to lengthen the chains for the return trip to the woods, and to shorten them in hooking up to get some lifting action on the front end of the load. The whiffletree should be fitted with a grab hook on a swivel at the center, for attaching the skidding chain. A lifting ring attached to this grab hook will help eliminate the risk of pinched fingers in hooking up the load.

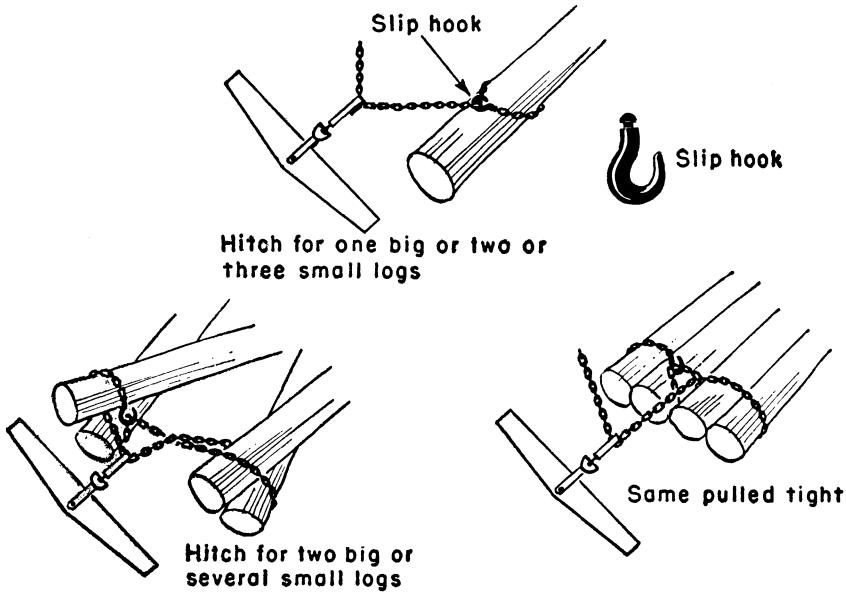


FIGURE 57.—Hitches for ground-skidding small poles.

Ground-skidding, particularly of small poles, is usually done with a chain. A chain of $\frac{1}{2}$ -inch steel links, 10 or 12 feet long with a slip hook at one end, is usually used. This can be wrapped around a single pole, or two or more poles, using the hitches illustrated in figure 57.

For ground-skidding bigger logs the chain is also used, but the skidding tongs are sometimes preferred because they do not add to the friction of the log on the ground. Such tongs can be bought to take logs up to 60 inches in diameter. Log grabs connected by short pieces of chain are also used for ground-skidding heavy logs. With these a tool called a grab skipper is used both to pound the grabs into the log and to knock them loose (fig. 58).

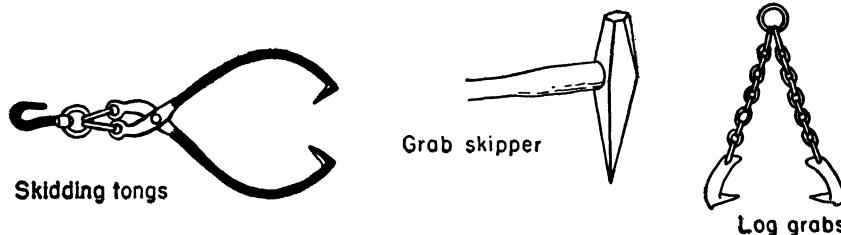


FIGURE 58.—Tools used in ground-skidding heavy logs.

To reduce friction still further, some type of device is frequently put under the front end of the load. This may be just a crotch or "lizard" (fig. 59). This is made from a hardwood crotch, rounded up on the front end, with a hole bored through to take the skidding chain. A cross beam is sometimes spiked on.

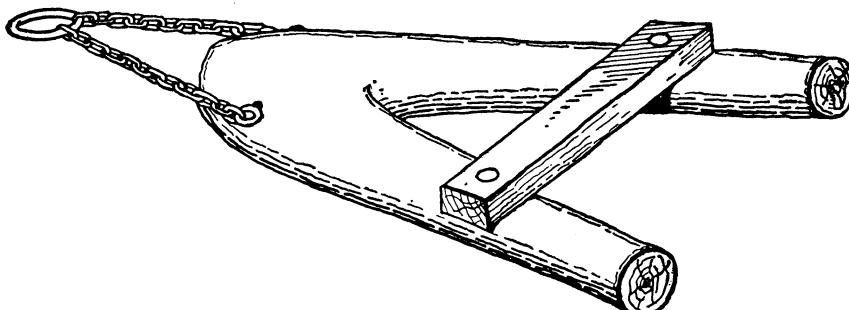


FIGURE 59.—A "lizard" is the simplest device for carrying the front end of the log.

Various types of sleds are also used. The simplest and one of the best is the go-devil (fig. 60). This is a loosely constructed sled about 5 feet long and nearly as wide, made by bolting a cross beam with a single bolt to each of two naturally curved runners. The front ends of the runners are kept apart by a roller, each end of which is held by a chain going through a hole in the runner, and fastened by an eye-bolt on the outside face. The roller is frequently a length of iron pipe through which the chain is run. The draft is provided by still another chain, attached at either end of the cross beam by eye-bolts. The runners may be shod with steel, but ordinarily are unshod. Be-

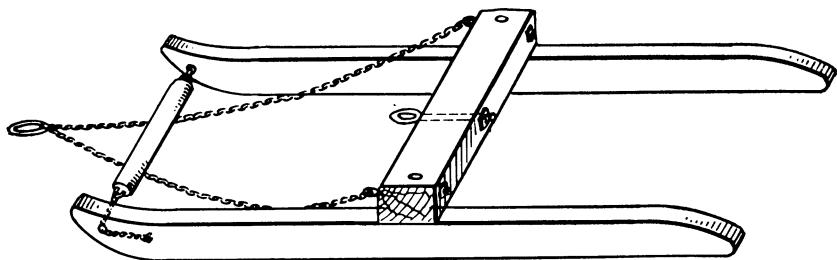
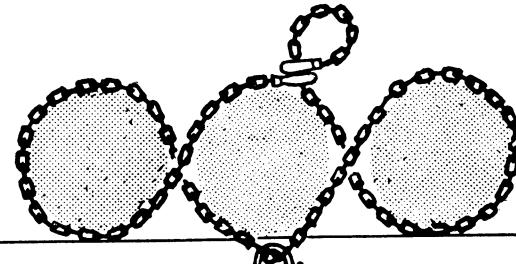


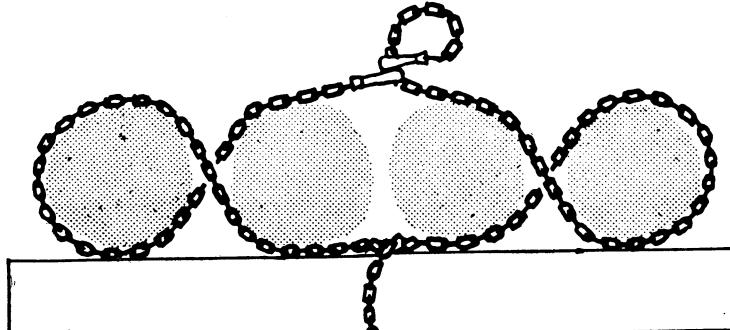
FIGURE 60.—The go-devil is a versatile sled.

cause the go-devil is so loosely articulated and so flexible, without thills or tongue, it can be moved around in close quarters in the woods, and can take a lot of punishment.

Yarding sleds are more conventional, with the cross beam more rigidly fastened to the runners by wooden or steel raves, and with thills or a tongue. Frequently a bunk is fastened to the middle of the cross beam by a kingbolt. When this is done the logs can be chained securely to the bunk and the load can be taken around curves without the racking that it would get if the kingbolt did not provide a swivel. When the bunk is not provided, the chain should go around



3 LOGS, D-RING ON BUNK



4 LOGS, NO D-RING

FIGURE 61.—The "Baltimore hitch" for fastening the front ends of logs to the sled cross beam.

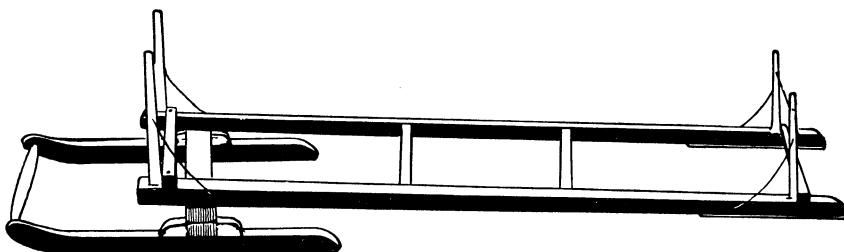


FIGURE 62.—A dray for carrying pulpwood.

the cross beam only at the center, in something like the "Baltimore hitch" invented by a Sherburne, N. Y., farmer-logger (fig. 61).

If short bolts are to be skidded from the woods they may be dragged sideways by wrapping a chain around a bundle of them. This chaining is a favorite method for bringing bundles of pulpwood down steep slopes in the north woods. Or they may be loaded on a scoot or dray. A dray is a yarding sled with a couple of long poles fastened to the bunk, and stakes at the front and back to hold the load of wood piled crossways on them (fig. 62). The scoot is a heavy sled on which the logs or bolts are carried completely off the ground (fig. 63).

The scoot is especially popular in the glaciated country of the north woods, where the gravel is full of highly abrasive particles of quartz or granite that become embedded in the bark of any log dragged on the ground and damage the saws and knives at the mills.

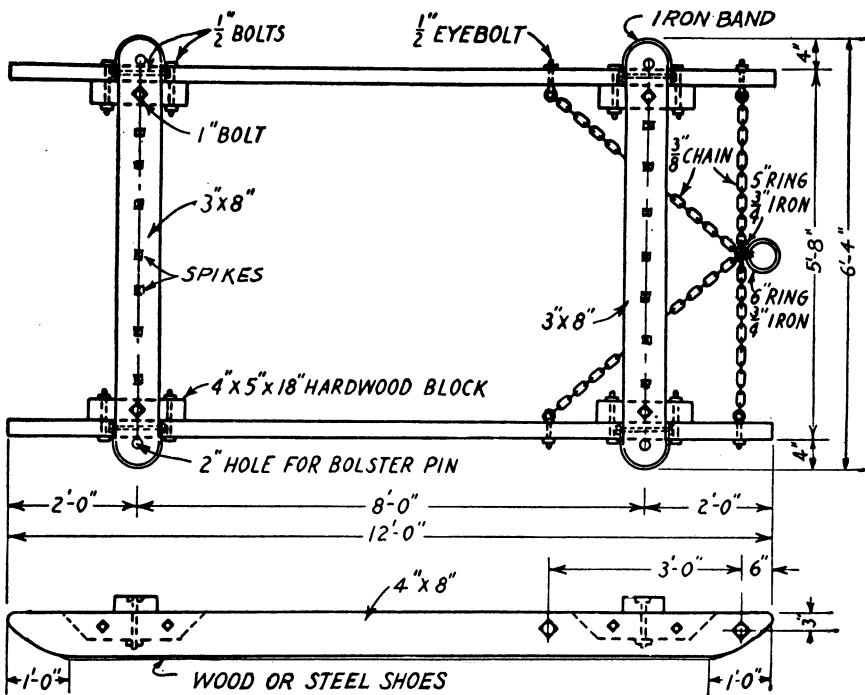


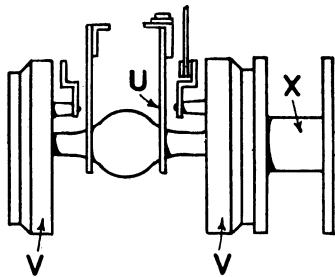
FIGURE 63.—Plans for a horse-drawn scoot.

WITH TRACTORS

A tractor is generally cheaper than horses for skidding distances of more than 200 or 300 feet. For distances of more than 500 feet an antifriction device such as a scoop or sulky should be used with the tractor.

The special equipment that can be used with tractors makes them versatile machines for logging. The most important equipment for skidding is the winch. With a winch, a tractor can develop 50 to 80 percent more power than it has at the drawbar.

The winch—and the wire rope it carries—can be used in many ways in skidding. If you cannot drive the tractor into a swampy spot, or down a steep pitch, or into a rocky and brushy area to skid a log out, you can carry the cable in, hook on the log, and use the winch to pull it out.



**V - Hubs and brake equipment
of rear axle**

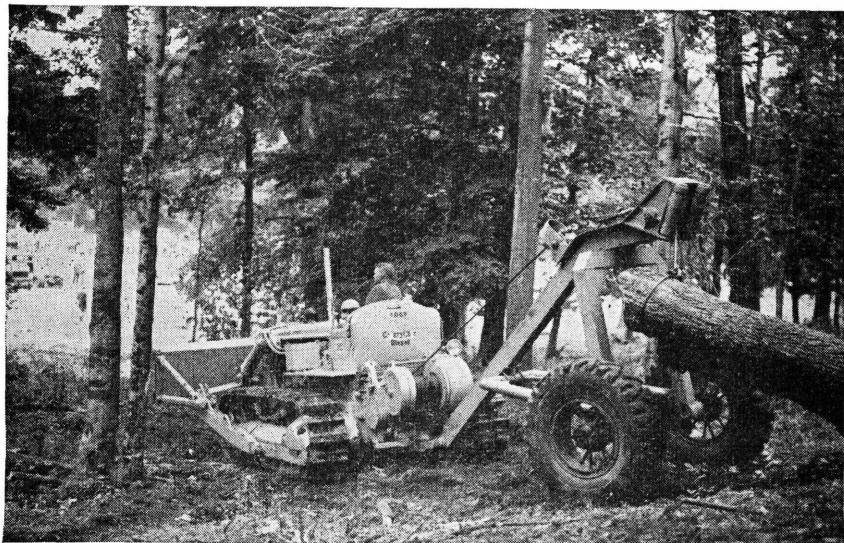
**U - 3/4-inch U-bolt supporting
rear axle housing**

X - Drum for cable

FIGURE 64.—Winch made from automobile differential.

When you are skidding a load behind a tractor and you encounter a muddy area or a steep grade that the tractor cannot get through or up, you can put the winch into reverse or free wheeling, drive the tractor ahead to better ground, then use the winch to pull the load up to the tractor.

Rear-mounted winches for small tractors can be obtained commercially. They can also be manufactured at home or by a local machine shop from old automobile differentials or transmissions. One made from a differential is shown in figure 64. Power is carried from the power take-off on the tractor to the stub of the differential drive shaft by roller chain. The axles of the differential are cut down and the winch drum installed on one side. Then the brake drums are reinstalled and hooked up. When the brake on the winch-drum side is set, the drum is stationary and the load can be towed. When the brake on the opposite side is clamped tight and the one on the winch-drum side is released, power is applied to the winch. When both brakes



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FIGURE 65.—A tractor equipped with winch and sulky.

are released, the winch is in free wheeling and the cable can be pulled out.

Sulkies—primarily for use with crawler tractors—are used to lift the front end of the log off the ground and to reduce friction (fig. 65). With a winch and sulky the crawler tractor can assemble a load of logs, pull them up into the arch of the sulky, and take them in to a landing.

For this kind of logging it is important, however, that the trees be felled in the right direction in the first place, usually at an angle of 10 to 45 degrees to the direction in which they will be pulled out, in order to make bunching possible without need for switching the lengths around. This is particularly important with long logs or tree lengths. Turning them around is not only time consuming, but it can be responsible for great damage to the remaining trees and reproduction in the woods.

For logging with scoots many northeastern loggers are installing winches and booms on their tractors to assist in bunching and loading the logs. Some of these scooter loaders are home-made, with wooden or steel booms. One using a wooden boom with a hemp rope dragline and a winch with gypsy drums, developed by a Great Barrington, Mass., logger is illustrated in figure 66. These rigs commonly use timber tongs to grab the log, and are effective in bunching loads over a 30- to 60-foot radius.

Crawler tractors equipped with bull- or angle-dozer blades are able to make their own way into the woods, pushing aside obstructions and if necessary levelling off their own skid trail, with little or no hand work. However, they should not be run around steep side slopes. The danger of side-slipping is too great, and when a crawler goes into a side-slip there is little or nothing that the operator can do except



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FIGURE 66.—Tractor equipped with winch and boom for assembling load and loading scot.

try to swing around up or down the slope where his grousers will have some grip. The danger comes in slipping up against a rock, stump, or other obstruction, and upsetting the tractor. Many a tractor operator has lost his life in such an accident.

LOADING

LOADING SMALL WOOD BY HAND

Most of the pulp, mill, and fuel wood in the Northeast is still loaded stick by stick, by hand. Generally the teamster loads his own wood on the sled or dray in the woods, and then unloads and ricks it again at the roadside. Sometimes he has help at both points, more often not. The time it takes to do this job varies widely, depending on the size and shape of the sticks, the distance he has to walk, and his own skill. Even under the best conditions it generally takes at least 15 minutes to handle a cord, and under the worst it may take an hour. A skilled man with a pulp hook can do the work faster than an inexperienced worker loading the material by hand. The trick is to reduce bending over and lifting to a minimum, using the pulp hook as an extension of the right arm to pick up the bolt and propel it onto the load.

LOADING SMALL WOOD BY MACHINE

Many machines are being developed to facilitate the work of loading small bolts and billets of wood. Most of them are much too expensive and elaborate for use on the farm woodlot, although some of the using companies may want to use them to pick up the products of the farmers' logging efforts at the landing or the roadside. Among these are logging cranes and self-loading trucks adapted to handling bundles and pallets of wood.

Well within the field of many farm woodlot operations, however, are the simple conveyor-type loaders for handling individual sticks. These can be constructed at home. All that is required is a triangular

wooden frame, over which a roller chain equipped with lugs is run, propelled by a small motor. One such machine is designed with a double chain to carry heavy bolts sideways from the ground to the tail of the truck. Others are made with only a single chain running in the bottom of a V-shaped wooden or steel trough, to carry the bolts endways. This type of loader is useful chiefly for handling heavy hardwood bolts on the lift up to the truck. The wood still has to be carried from the pile to the loader, and from the back of the truck to its place on the load. A more elaborate loader can be constructed in three sections, one to carry the bolts along the ground, the second to lift them up to truck level, and the third to carry them over the truck bed. With such a loader three men, two on the ground and one in the truck, have been timed loading 3 cords in 9 minutes.

LOADING LOGS AND POLES BY HAND

Logs and poles generally are too heavy to be lifted by hand for loading, although some small logs are loaded in this way. Usually they have to be rolled. Logs can be rolled up inclined skids to the truck bed with the aid of a cant hook or peavy. Two men, one to hold the log while the other is getting a fresh grip, can do this with considerably more ease and safety than one man can working alone. Spikes or notches in the skids help hold the logs from slipping and rolling back.

It is better, whenever possible, to arrange the skids so that the rolling can be done more nearly on the level. Often a place can be

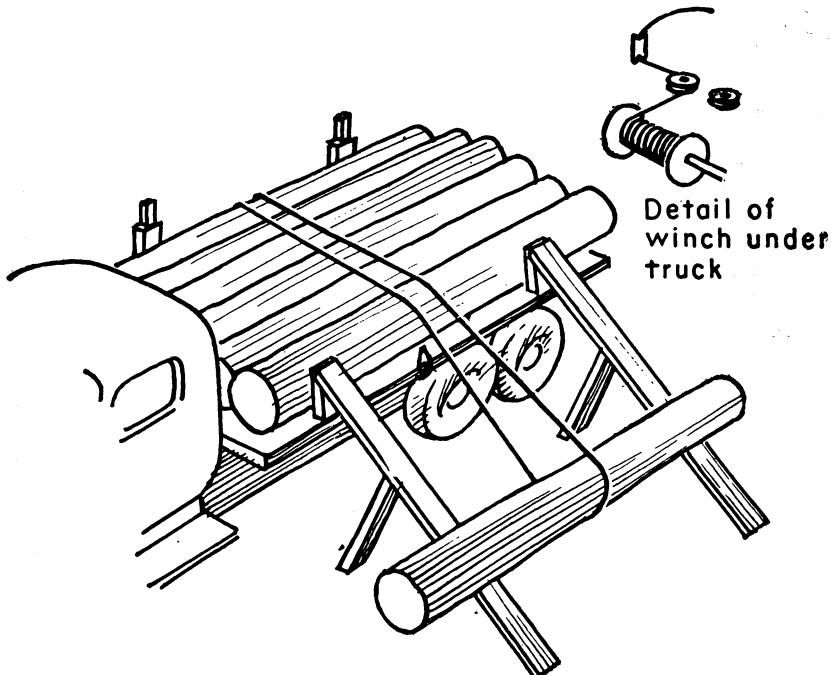


FIGURE 67.—A truck can be equipped to provide the power for its cross haul.

found where the logs can be landed on a hillside and skids placed from the hill to the truck bunks. This may require long skids, which are apt to break. A skidway or brow on the hillside at the edge of the road is better; short skids can be used to bridge the gap to the bunks or bed of the truck.

SIMPLE MECHANICAL MEANS OF LOG LOADING

One of the most common methods of loading logs onto a truck or wagon in the Northeast is the cross haul. This requires a chain or cable, each end of which is fastened to a truck bunk. This forms a loop. The middle is passed under the log, then up and over it and back over the truck bed to the source of motive power. This may be a team



FIGURE 68.—An A-frame jammer can be home-made.

F-442694

of horses, a tractor, or a winch. When power is applied, the cross-haul chain or cable rolls the log up the skids onto the truck bed. Recently several loggers have equipped their trucks for cross hauling, with a winch under the bed, powered by a power take-off on the drive shaft. The cable from this winch comes out through a sheave mounted in the center of the side of the bed, up over the bed, and down the other side to the log on the ground (fig. 67).

Another standard home-made device for loading is the stiff-leg jammer. This is usually an A-frame mounted on a sled (fig. 68). (It must be guyed at both top and bottom.) A rope or cable—usually provided with a crotch line and end-dogs—is fastened onto the log. This cable passes up through a sheave at the top of the A, then down to another near the base, and then to the source of power. When power is applied the log is both lifted and dragged up to the truck and, by means of tag lines on the end-dogs, the log can be placed on the load with considerable accuracy.

The gin pole is still another easily made loading device (fig. 69). It consists of a pole attached to the base of a tree by a swivel, and at

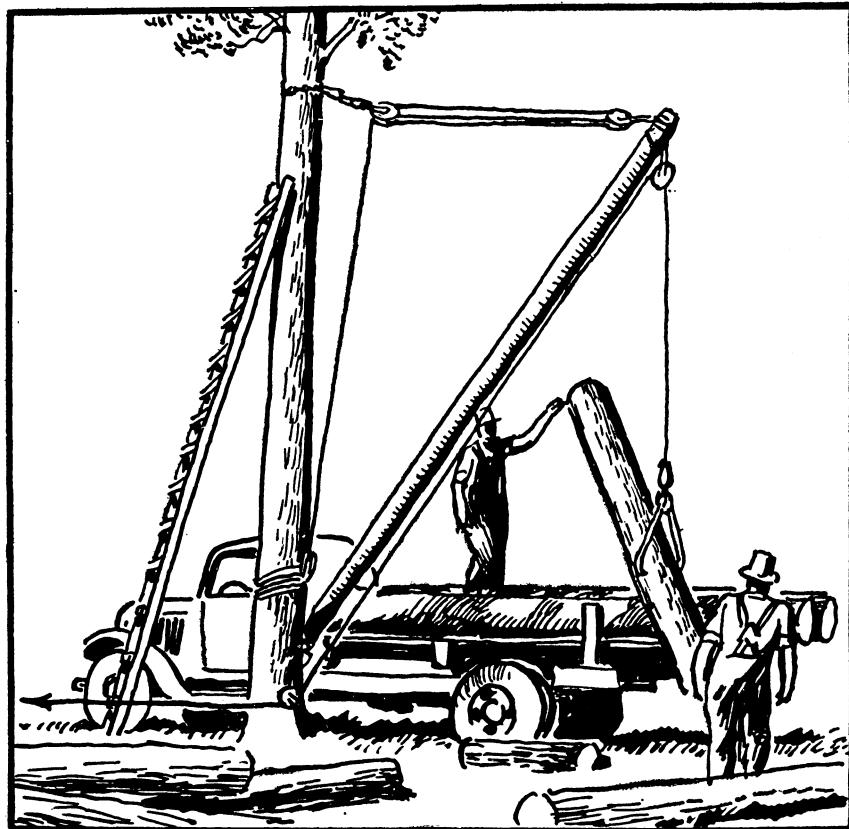


FIGURE 69.—The gin-pole loader swivels around. Cable goes through bottom sheave to source of power.

the top by a cable. A sheave hangs from the top of the pole and another is hung on the tree near the bottom. The cable, which may end in either a crotch line or loading tongs, goes up through the top sheave and then down through the bottom one and to the source of power. The loaders on the ground attach the log, the power device pulls it up, and then the loaders push it, with the pole swinging on its swivel, to the place where it is to be dropped.

These three simple loaders and various adaptations of them are used under different conditions. The cross haul is generally used for scattered logs because it is the most portable. The jammer, which is



F-450144

FIGURE 70.—Truck fitted with timber tosser.

less portable, is used when a number of logs are to be loaded in one place. The gin pole is used when loading is to be done at one place for a considerable length of time. Much work is needed to move it and rig it up.

More and more self-loading trucks are coming into use. Very rarely will the farmer be justified in acquiring or making one of these devices, but wood-using industries and their contract haulers are obtaining them and installing them on "milk-route" systems of picking up forest products brought to the roadside by farmers and other small operators. Besides the truck equipped with its own cross haul, the "timber tosser" (fig. 70) and the truck fitted with a jib-boom crane (fig. 36, p. 27) are popular types of self-loaders for trucks.

HAULING

The ordinary flat-bed truck, used so widely on the farms of the Northeast, can be readily equipped to haul a variety of forest products.

Even when he sells the major products of his wood lot at the roadside, the farmer will frequently want to haul some logs to the mill for custom sawing, or some fuel wood or other material for use on the home place.

Stake racks for hauling fuel wood and pulpwood will frequently be available for the farm truck.

If logs are to be carried on a flat-bed truck it is a good idea to put wooden or steel bunks across the bed (fig. 71). This will give a firmer



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FIGURE 71.—Flat-bed truck with log-carrying bunks.

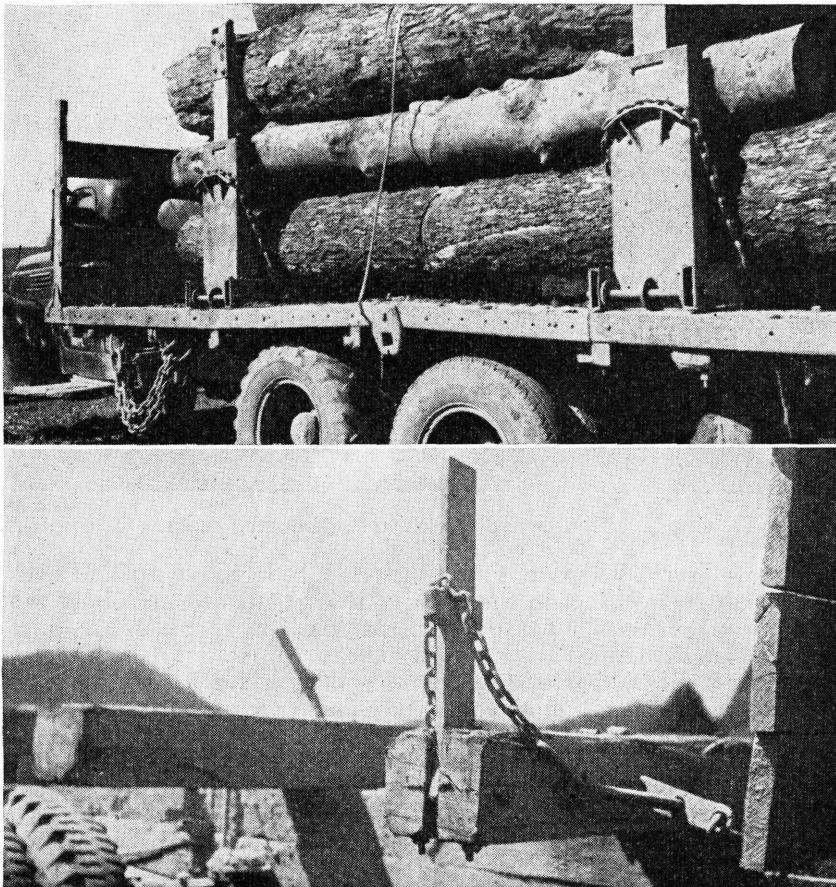
support to crooked logs, and save the truck bed from wear and tear. Stakes can be installed in the ends of these bunks to help hold the load, although Vermont (and perhaps some other States) require that the load be chained even though stakes are used.

In the past few years safety tripping devices for log-truck stakes have become more and more common. These are of many types, but they all allow the stakes to be dropped by pulling a lever on the opposite side of the truck from which the logs drop off. In the past many a trucker has been seriously injured or killed by failing to get out of the way after loosening stakes on the same side of the truck on which the logs fall. Two simple types of safety tripping stakes are shown in figure 72.

Remember that green wood is heavy and do not overload your truck. A cord of maple, birch, beech, or oak may easily weigh $2\frac{1}{2}$ tons, and a cord of green pine may weigh 2 tons. Helper springs on the rear of the truck, or a supplementary axle (fig. 73) may be necessary to enable the truck to carry a reasonably full load.

In addition to guarding against overloading your truck, it is also necessary to balance the load carefully when you are hauling a product as heavy as green wood. Many farm trucks have too short a wheel-base to carry long logs successfully without an overhang at the rear. This is dangerous, particularly because it may reduce the weight carried by the front wheels, and make steering difficult or impossible. (A supplemental set of rear wheels will help solve this problem.)

On the other hand, the load should not be placed too far forward. This puts too much weight on the front wheels, makes steering difficult, and may result in blowing out a front tire. Generally trucks run best when about 25 percent of the weight of the load is on the front wheels. This means that three-quarters of the load should be balanced over the rear wheels, and one-quarter more extended toward the cab.

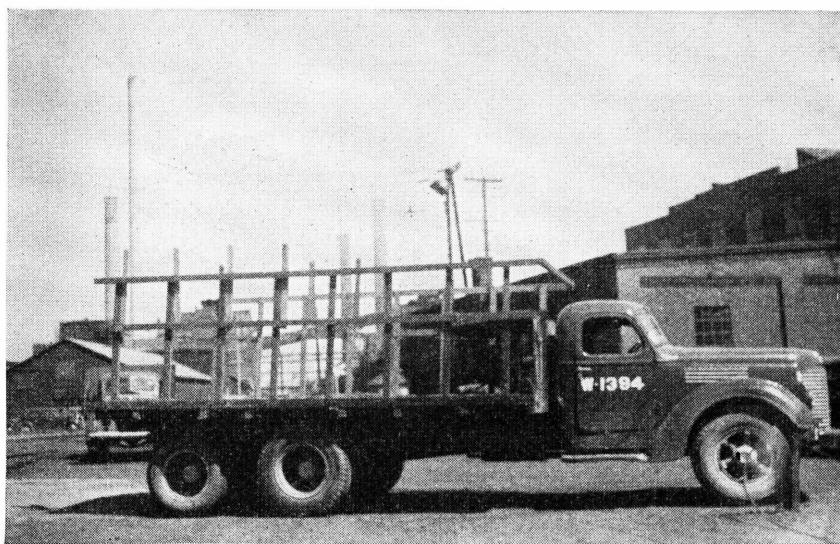


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FIGURE 72.—Two types of safety tripping stakes.

The load should be balanced across the truck bed, also. If it is not, the truck may tip on a curve or slope and blow out a tire, or even upset the whole load.

Tires should be in good condition, well matched (particularly on dual wheels), and evenly inflated. If one of the tires on dual wheels overheats, it is carrying too much weight. A better matching of tire diameters should be made.



F-441907

FIGURE 73.—Truck equipped with supplementary rear axle.

The cautions given above apply generally to carrying other heavy loads on the farm truck, but they are particularly important in carrying heavy wood products. Trucks, like other equipment, are becoming better and better, and require less attention; but the farmer should remember that all mechanical equipment used in logging generally works best and most economically when it is kept in good repair, properly oiled and greased, and the instructions of the manufacturer as to capacity and maintenance are not disregarded.

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